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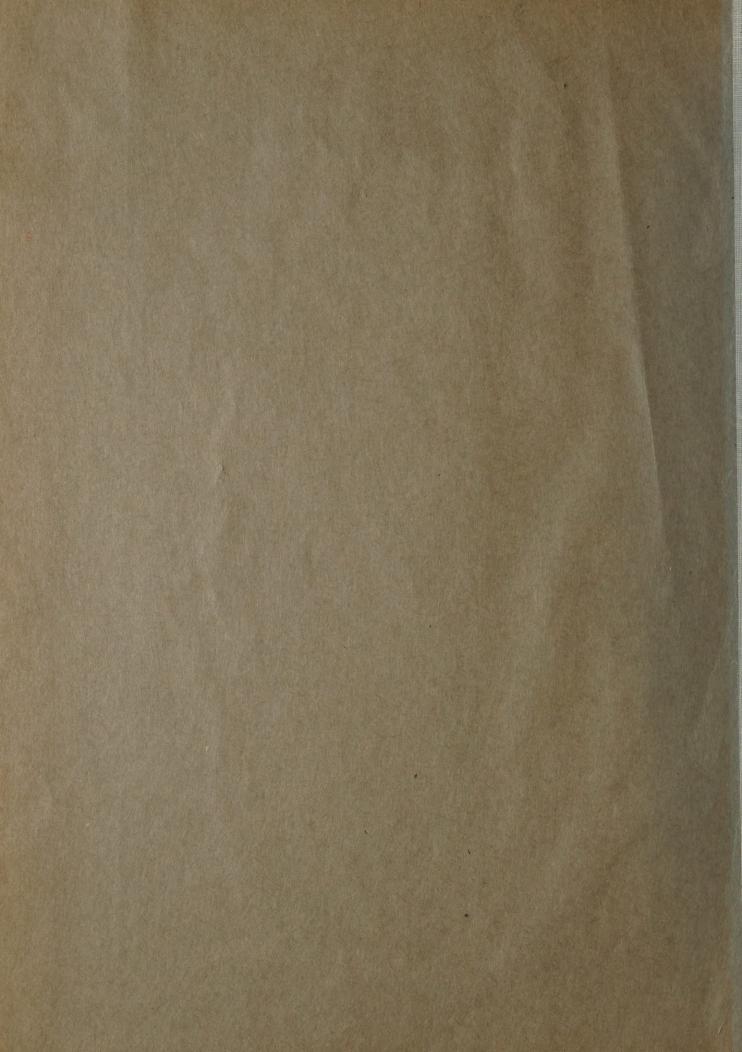
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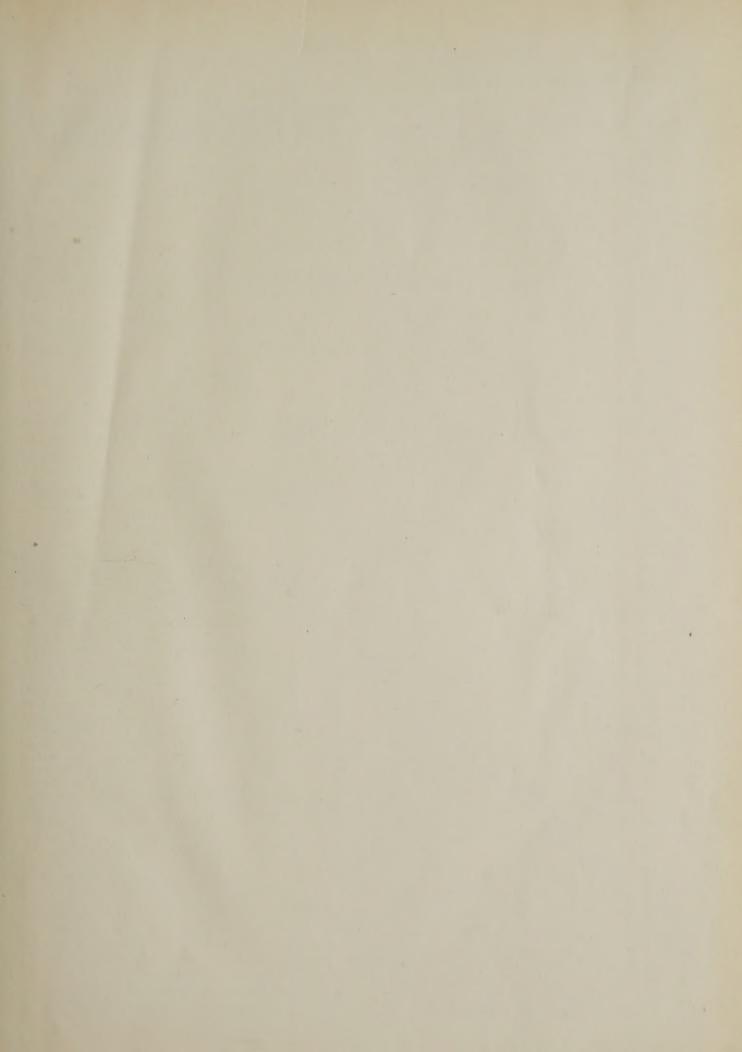
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Keep on Keeping On

ADVERTISING R. S. DARLING W. B. MAYOR H. P. SESSIONS

Vol. 62

July, 1919

No. 7

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CREOSOT-

DOVETAIL

This Binghamton, N. Y., home is shown, in the top picture, ready for Stuccoing. See those spaces between the wood strips of the Bishopric Stucco and Plaster Board? They are the dovetail keys which imprison the Stucco. Once Stucco is applied, it is locked rigid forever by these thousands of keys.

Note how the joints of the Board are broken every few Board are broken every few feet. This strengthens the purchase of the keys by distribut-ing the strain of the Stucco. The walls cannot sag or crack anywhere because they are completely unified.

ISHORPIC BOARD was nailed so securely to this building that the weight of the average Stucco wall—10 to 15 pounds per surface foot, could not possibly budge a single wood strip. Bishopric Board's resistance to deformation in the plane of the wall is extraordinary. No other Stucco base can be nailed so securely. The beauty of this Binghamton home is insured for its life. The Stucco will always be smooth and fresh looking. Repairs will never be necessary.

Bishopric Board is the background that prevents cracking of Stucco. It insulates perfectly. It also completely sound-deadens the home. It is the most economical Stucco base and gives the Architect and Builder an opportunity to provide special

conveniences with the savings made. One-third less plaster is required on account of the dovetail grooves. There is no waste—1,000 sq. ft. covers 1,000 sq. ft. of surface.

Bishopric Board is a combination of materials and principles that have been in constant and successful use for ages. It is protected in every way against the ravages of time and atmospheric change. It keeps the home always dry.

In interior use it saves plaster, time and labor, insulating against heat and cold and deadening sound to a remarkable degree. Bishopric Sheathing, our new product, saves 30 per cent as compared with 7/8 wood Sheathing and makes a solid, compact wall.

> Architects and Builders: Send for Booklet which tells your clients all about Bishopric Board. It contains the perfect Stucco mixture; reports of tests; and endorsements by Engineers, Architects and Builders

The Bishopric Mfg. Company

907 Este Avenue



Cincinnati, Ohio

NATIONAL BUILDER

Volume 62

Chicago, July, 1919

Number 7

Keep On Keeping

A NY further hindrance to production makes him a permanent worker in any means delay in reconstruction. Every one employment. This prevents that effort must be made to keep on keeping on. Our friends in Canada have been badly bitten by the "one big union" idea,

and it is said this propaganda has been largely aided by funds from American radicals. The cartoonist depicts the situation in a very understandable way. After eight months, since the armistice, we have, as it were, about completed the inventory of the materials we have on hand and then estimated with moderate accuracy our ability to produce Secretary Redfield's more. Trade Commission checked up the situation with representatives of various industries, and the commission announced the prices that would be fair under these conditions. But as stated before, the Railway Administration refused to believe the story. Now supply and demand is regulating prices, and perhaps it is as well that it should be so. Demand is pushing ahead and prices are tending to advance, and this is having the effect of convincing the former skeptics that "Now is the time to build."

The Federation of Labor convention placed itself clearly on record against radicalism, but also announced a 44-hour week and higher pay as part of the labor program. This

must necessarily require intensive study and efficiency on the part of the worker and a larger dependence on labor-saving devices on the part of the production manager.

Our tendency has been to make business the object of living, but now we are turned the other way and must realize that living is the object of busi-

The significance of this to the builder is shown in the various industrial housing developments described in the pages in this issue. Contentment in the worker kind of loss that is called "labor turnover," which simply means that the time taken to break in new help is a clear

WHY CAN'T PEOPLE THINK OF THAT BEFORE BREAKING UP ALL THE FURNITURE?



It looks simple enough when we see it in our neighbors Copyright, 1919, New York Tribune, Inc. Reproduced by permission.

waste not only to the employer but through him a clear waste also to the country. A realization of this fact is becoming so general that not only will there be an immense impetus given to such building, but old buildings not up to standard will be reconstructed or torn down and rebuilt.

That there will be a shortage of labor cannot be questioned and the attention of builders is seriously called to the work of the government in aiding disabled soldiers to receive an education to fit them for any calling for which they are

fitted and which their disabilities will allow. It is not only a patriotic duty but a great opportunity for builders to seek out such men and co-operate with the government in offering them the

nreans of serving themselves, the industry, and the state.

The wealth of the country is almost beyond belief. Two thousand million dollars in the winter wheat crop, and the immense return from other crops and live stock will net the farmers enormous purchasing

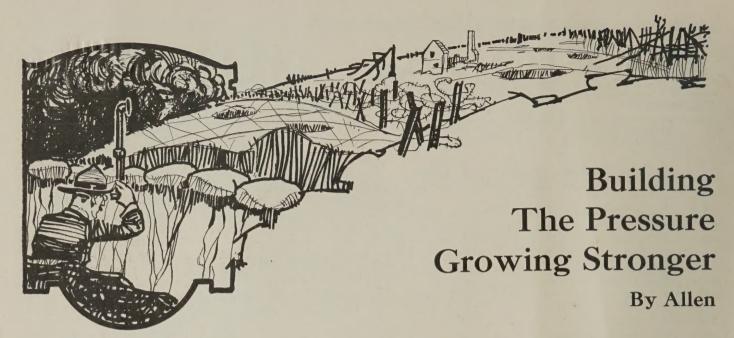
The demand for merchandise by Europe promises to be such that there will be almost unceasing activity in American industries.

Buildings and more buildings must be supplied to meet the rapid expansion. Anything is too dear if you have not the money to buy it, but high wages and high prices, while going hand-in-hand, mean that there is money to buy-and nothing is too dear if you have to have it and have the money to buy it. And this is the truth about building.

By keeping on keeping on, production-wealth - will pile up and everyone will share in that prosperity. The fat years are following the lean years for the builder.

In this issue appears an informing illustrated article descriptive of the activities of the government in providing

plans and other information for builders, farmers and home-seekers. This service is only the beginning. This country must be to a greater extent the "supply house of the world" and the increase of building that is required demands the easing up of credit—a recognition of a man's ability to pay, in time, with a just interest. There is coming to be recognized more clearly what might be called a "character" credit. A risk in a man's honesty and power to earn is as good a risk as a gamble in stocks-and more constructive.



F YOU will place your eye to the country's periscope you will glimpse the immediate future of building. We are in a trench of uncertainty. The knoll, behind which we are still crouching, is the rising cost barrier. No-man's land is the shortage in the national supply of building materials. The barbed wire entanglements are labor troubles and the low hanging cloud above is the slow money market. But the glowing sky at the horizon is the country-wide need for new buildings. It is the sign of promise.

Scientists tell us that the unseen sun far beneath the curve of the earth sends its rays upon atmospheric atoms which, reflecting them, project the rays in a glow upon the earth. This we call sunrise. It is the symbol of the nation's construction future. The demand is rising, like the sun.

While there is turmoil over labor, costs and scarcity of materials and money, there is a mighty power developing that no effort of man can successfully combat. That power is Demand. All the forces of financial manipulation is not sufficient in this country to balk the might of a universal cry for adequate shelter. It is the glow in the eastern sky.

Building construction has its boom when it is more profitable to build than to put the money into stocks and bonds. Just at the present time quicker and bigger profits are being taken out of stocks and bonds.

In the greater cities realty investors freely admit that with building costs high they have sought to increase their building funds by making rail, industrial and mining investments. Many lambs have, incidentally, been led to the slaughter and there will be no construction from their funds, that is, upon the site originally intended. Great insurance companies, whose attitude on building loans influences the opinions of lending officers of savings banks throughout the country, have taken heavy engagements of Government bonds. Many others



who have had money saved for the purpose of building prior to or during the war, have thought best to put this money into business expansion, hoping, by larger earnings from these sources, to hold out for a more favorable time for building. But they are discovering that there is no time like the present.

In every instance the trend now is to provide for building construction upon the original, or even larger plan. The man who planned a \$10,000 home and finds that his \$10,000 will now buy only a \$6,000 house, is not proceeding with the \$6,000. He is trying to add not \$4,000, but \$5,000, to his original fund so as to build even better than he originally planned.

The best part of a year has passed since the armistice was signed and money has been in greater circulation than ever before. The astonishingly small number of business failures attests the fact that the country is prosperous to an exceptional degree.

Did anyone ever know of low prices during an era of prosperity?

The skilled labor situation is becoming daily clearer and the unskilled labor situation daily more dismal. That means a larger use of labor-saving machinery and a relocating of floating skilled labor. This implies the greater concentration of skilled artisans, whether they are employed on the building, on



engineering work or in factories, resulting in steady occupation. Industry well occupied means continued free circulation of money, causing greater activity, the re-opening of other factories and mills and with the re-opening of these factories and mills, warehouses, terminals, office buildings, hotels, theaters and homes will be in demand and must be built.

The periscope reveals a golden tinge to the horizon as the rising sun of prosperity reaches its level with the top of the earth. It is the flow of interest from debtor nations abroad, of returns from harvested crops, larger than the country ever has known; it is the turnover of industry reaching out to grasp a world market and, lastly, it is the flood of investment money from the intangible securities of Wall street to the actual and permanent investment of real estate improvement.

No legislative power can force money into unproductive channels. Until the turn of the first half of the year real estate has not been an immediately productive channel of investment, compared with the glitter of a "million-a-day" security market. New York and Illinois, as well as other states, have been trying to legislate the cork into the Wall street investment bottle, but with small success. When the time comes investors will realize the true situation and then building will come into its own.

That time is here. The sun has risen. Building is on its way.

The nation knows that there is actual danger in further deferring construction work. Costs will not recede. Instead, they will advance in exact ratio to the amount of building that is deferred. The fewer building products used, the more building material plants will close, thereby putting premiums upon the products of the plants that do operate.

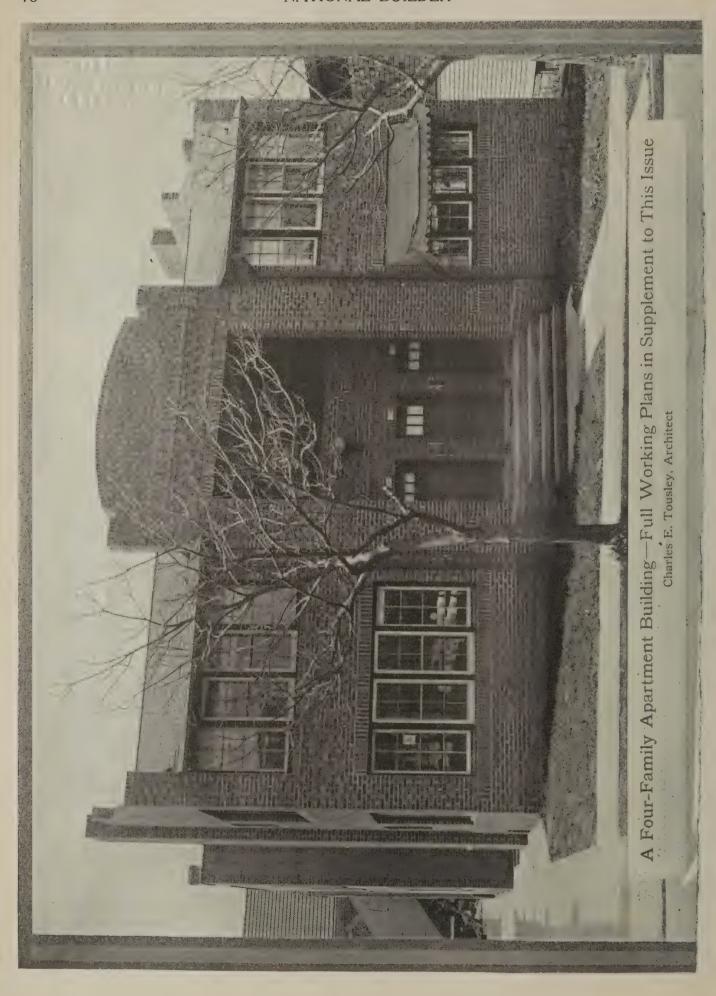
So investment money is now being taken from Wall street and put into commercial, industrial and special types of income-producing structures, like hotels, theaters in larger



quantities, not because of coercion or from any philanthropic desire to provide shelter for the victims of high rents, but because the condition of under construction, in an eight months' try-out, has been proved to be actual. In other words, the demand for building investment has been shown to the satisfaction of investors because the rate for building money is slowly rising above the profit-taking level in Wall street.

It is a start. Some still think it is a false start. Nevertheless, the effect of the signing of the Peace Treaty upon money and investments, building material supply and labor, must be so enormous that it cannot even be guessed.

One of the greatest problems that time only can solve is the adjustment of the relations between capital and labor. The recent convention of the Federation of Labor placed the organization on record as determining to work out its problems on American lines. It must devolve upon the responsible chiefs of the labor movement to bring about a realization that collective bargaining can never dissolve the inborn desire of individual competition. The inequalities of men themselves must eventually be recognized by the rank and file. It is upon this principle that collective bargaining must do its planning in future if it is to use its power constructively.



Will An Apartment House Pay?

MUCH of the talk of the shortage of houses is misleading! The expression is often relative rather than positive. Our problem isn't altogether one of quantity, but rather one of quality. Many of the communities which are exerting themselves to the utmost in an attempt to build new houses are already supplied with more houses than would be required to fulfill their needs, providing that people would rent them!

This is where the rub comes. People are clamoring for houses and are willing to pay high rentals for them, but they demand a run for their money. Just any sort of a house won't do. It must be a desirable house, a place where they can live in comfort; bring up their children in decent surroundings, and a place where they can entertain friends without apologizing for the house or its neighborhood.

True enough, many more or less undesirable houses are now rented, but how much rent money do they bring in, and how about next year and the year after? A large number of the tenants are living—existing, most of them say—in these places only until more desirable quarters are available. Just as soon as they can they move into the better class of buildings and a "for rent" sign goes up on their former place.

In most communities the demand for new houses and apartments is so heavy and so insistent that it gives the wrong aspect to the problem. Just now, almost any sort of house or apartment that can, by any reasonable stretch of the imagination, be called a desirable place to live, is easily rented.

On the other hand, even now, houses or apartments that are noticeably lacking in proper sanitary equipment, lighting systems and so forth, or those that are located in undesirable neighborhoods, or that have a run down appearanceeither outside or in-are a drug on the market and most people won't have them. From this it is logical to assume that before many months a large number of places that are now bringing in good rentals, but are rather on the fence with regard to desirability, will drop into the "undesirable" class and will either remain vacant or can be rented only to tenants who can pay a comparatively low rental.

The builder who specializes in apartment and flat buildings should look carefully into the future. The mere age of a building often has nothing at all to do with its desirability or value. Many flat buildings that were built twenty years

ago bring in more rentals than do others that represent a larger investment and are perhaps only one-fourth as old. One of the principal things to look out for is the locality. Of course, no one is likely to deliberately put up a good building in a neighborhood that is already run down, but many times the neighborhood slumps shortly after the new building goes up and the owner pockets a big loss. No one can determine beforehand just what a locality will do in the next twenty or thirty years, but very often the tendency is apparent if one looks just beneath the surface. A serious effort should always be made to determine the future

Note that complete working plans of the Four-Family Apartment Building here described and illustrated forms the Supplement to this issue.

value as well as the present one. Guesswork should be eliminated insofar as possible and if the decision lies between two localities, one which is cheap but with a problematical future, and one which is more expensive but has a good future reasonably assured, the latter should be given preference. This factor of future desirability is usually more important in rental property than in that which is built to sell. The value of rental property depends entirely upon whether it will be a profitable investment during a period of a great many years. The investment value of property which is built for sale depends only on the immediate profits.

Another mistake that is sometimes made is the failure to take into account the depreciation of the building itself. The workmanship and materials are skimped to the last degree and altho this will often have no effect on the rentals during the first few years, it will sooner or later become evident and the investment becomes a losing one. A building that is built for rental purposes should be well built and should be fitted with good substantial plu:nbing and lighting equipment that will stand up

under many years of more or less hard usage. Floors, trim, and hardware should be carefully selected for durability as well as appearance. A run down building, no matter how good the neighborhood, will not bring in much rent money. It is the poorest sort of policy to skimp any sort of building, whether it is built for sale or for rent, but especially the latter.

The apartment building, which is the subject for this month's supplement, contains four apartments of five rooms each. It was designed by Charles E. Tousley, architect, for P. J. Turnbull, plumbing and heating contractor of Cleveland, Ohio. It is a clever design in brickwork, offering many unusual features in the treatment of the exterior. The only ornamentation is afforded by the brickwork itself. By means of panels and patterns the design has been made interesting, and altho the appearance is not so "flashy" as is often the case with apartment houses, it attracts considerable attention because of this very fact. The slate roofs beside the central arch give a domestic quality to the design which would not be so apparent without them.

The entrance is novel not only in appearance, but in its plan. The four separate entrances, each opening directly from the porch, is unusual, as is the balcony directly above them.

It will be noticed that each apartment has its own separate inside stair to the basement. This seems hardly necessary unless the basement were divided into four separate parts—it does no harm, however.

The apartments are almost identical, with the exception of the stairs just noted, and the minor differences between the first and second floors caused by the stairs. The exterior stair serves all of the apartments and is built of steel stringers and rails and wooden treads. The back porches are of reinforced concrete.

The front balcony could be made available for use of the second floor tenants by cutting doors from the living porches, if desired.

This building never lacks a waiting list of tenants. It is desirable from the standpoints of location, appearance and convenience and its value as an investment will probably increase instead of depreciate.

HOUSING THE HOUSELESS

Starting Right, Planning Well, and Exercising Intelligent and Careful Supervision of All Work Will Do Much

To Reduce Costs

By Charles E. White, Jr.

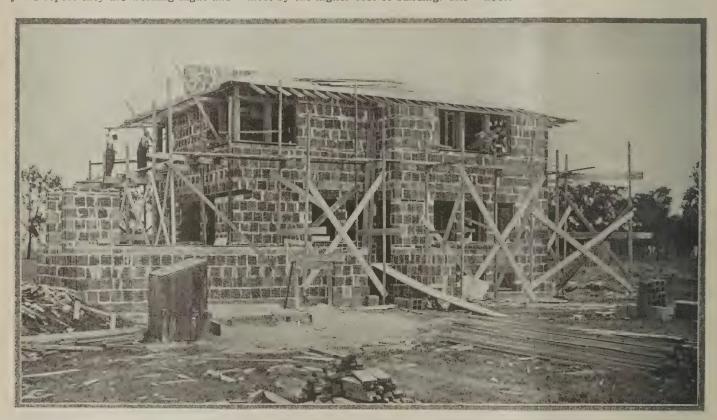
OST of building is higher than it by the low percentage they are figuring ever was before and yet in many communities there has been more building in June than has been recorded in any previous year. Contractors who haven't done a stitch of work in two years report they are working night and

in their bids.

Who gets the money? Somebody gets it, for the owner is certainly paying more for his building than ever before. Probably it is the mechanic who benefits most by the higher cost of building. His

bigger house than he is entitled to for present market prices.

"Make the living room fourteen by twenty-eight," he has told his architect, "with four good-sized bedrooms and a couple of bathrooms on the second floor."



Builders of houses, now on the jump in all sections, have shown no tendency to decrease the quality of their output. Hollow tile, as well as concrete blocks, make substantial structures. Usually they are plastered on the exterior with cement-plaster. When the shape of the structures is simple the excess in cost over frame construction is not great

day-working nights figuring jobs and working days building them. The hum of the building industry is continuous and the same hammering and sawing that prevailed in summer days before the war is apparent now.

Somebody is paying the price for building and somebody is getting the money, but who?

Material men claim they are not making a more-than-usual profit; the different trades say they are not getting it: contractors certainly are not participating in undue profits, if we are to judge

wages are much higher in all lines, both in the construction end as well as in the line of production of building materials.

Here is what is happening in most sections of the country. The experiences in one town are pretty much the same in every other. An owner decides to build a home (for it is in housing that there is the most activity just now, as every contractor knows). He has his plans and specifications made and gives them out for bids. Though warned by his architect that prices are high, he has, in his zeal, caused plans to be drawn for a

"You can't do it for seven thousand." advises the architect.

"Oh, yes you can," insists the owner. "McAdam is building a seven-thousanddollar house, and if he can do it, I can" (he guesses).

So plans are drawn for a house with cement foundations, iron columns for supporting the first floor, two big living rooms with a brick fireplace and a goodsized dining room and butler's pantry.

Plumbing is of the best, and electric outlets are scattered liberally throughout the rooms. The roof is shingled with

composition shingles and the outside walls are plastered with cement-plaster, rough cast.

To bring the house up to the grade desired by the owner, the architect specifies plate glass in all prominent windows, enameled paint throughout the interior, cement steps at the front and rear entrances, and there are several tile floors, to say nothing of built-in cabinets and bookcases.

What happens when the bids come in? Of course, the inevitable happens. Bids run all the way from eighty-five hundred to ten thousand dollars, and the owner goes up in the air.

Then there is dickering with the lowest bidders. Every contractor hates to lose a job, so they figure and figure and allow themselves to be squeezed a little here and there, clip their profit a little bit more and finally get down to the owner's figures.

Now comes the tug of war. No builder can possibly make a profit on the job except by the utmost of efficiency. There isn't five dollars leeway one way or the other and if he wants to make even a small profit he must watch the job keenly, and lay out the work for his men so that every particle of waste in either labor or material will be stripped away.

"Many builders will get stung in 1919," prophesied an architect to the writer a few days ago. "In their eagerness to get work they have not only figured low, but at the last minute when the owner wavered between going ahead or quitting, they made a further reduction, and must trust to luck that they will get out of it with a profit."

The owner is up against this proposition: He is confronted with an increased cost of building, from twenty-five to



Many of the new housing programs are now incorporating brick houses for permanence; the best of these are of hollow tile or concrete blocks, veneered with face brick; this construction costs no more than solid brick but is infinitely superior because of the hollow wall construction. For economy, anchor the brick to the backup blocks with metal wall ties; no need to use header-bonding

fifty per cent more than four years ago, but his income has not increased in the same proportion. So, naturally, he dickers with the builders and beats them down as much as possible.

It is the contractor's foreman who can save the day for him. If he has a good foreman who has brains enough to cut out waste, and energy enough to see that all work is done expeditiously and economically he will get away with the work and make a good profit besides. But if his foreman is not onto his job, if he doesn't handle the men skillfully, or if he cuts up material to waste, dollars will slip away from his boss every day the

job goes on and when he gets through he will find, most likely, that he has done all the work for the owner for nothing and made him a present of a few dollars beside.

In building a frame house the contractor should start with the lumber bill as the first place to save a few dollars by extra efficiency. Several busy contractors have made a saving of about fifty dollars on each small house by purchasing lumber in car load lots, delivered close to the building site, where the haul is short. At the same time they have succeeded in getting a better grade of lumber. One contractor I know of not only saved about a hundred dollars in this way, but he received from the owner a bonus besides for furnishing better lumber than the grade specified.

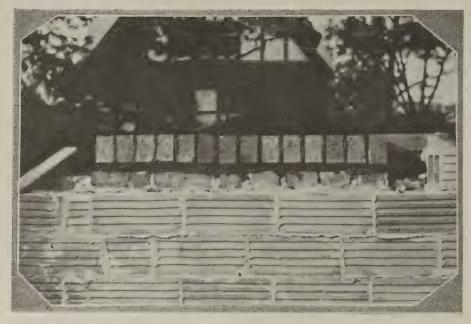
Contractors skillful enough to do it can usually save money by taking off their own lumber bill, instead of leaving it to the lumber dealer. They carefully figure every stick on the job, getting each as nearly the right length as possible, to avoid waste.

Did you ever see a pile of "scrap" lumber left over after a house was built? This is all waste, and the size of the pile determines the skill or lack of skill of the builder. When you see a house framed, however, and only enough scraps left over to build a good fire in the fireplace, it is going some. That builder is a crackerjack. He uses his head and will make a profit sure, if there is any profit in the job.

In spite of high prices the tendency in house building is to maintain the quality. Owners having seen the value of well-built homes are loath to give up all



Here is an excellent type of lintel, strong and cheap; a row of hollow blocks reinforced with metal bars and a concrete fill. Build them on the ground and aften they are set, hoist them up on the wall like a slab of stone



Brick sills usually cost less than stone sills and many architects think they are more artistic. To save on the cost of building, every contractor should be a "committee of one" to teach all these little points to the owner who, poor fellow, wonders where his money goes

the comforts they crave in the way of good plumbing and heating, carefully made mill work and a durable job of painting. So the builder is the man who is looked to when the job runs too high. He is expected to save the day by his extraordinary skill in keeping the price as low as possible without lowering the quality.

Hollow tile continues to be a popular material for homes, and builders are getting away with this enduring material at an economical price when architects have brains enough to design their hollow-tile houses with simple walls. Hollow tile can be laid in any fanciful shape, but there is no economy in doing so. For cheapness the sheets of hollow tile should be plain and the less bays and projections on a hollow tile building the more economical it is. The same also applies to hollow concrete blocks.

Usually these houses are plastered on the outside with cement-plaster and this appeals to the owner because a plaster house requires paint only on the trim; so he saves enough every time the house is painted to offset the increased cost of plaster.

Brick veneer on hollow tile should be encouraged by builders because it makes a much better house than solid brick and its cost is, to say the least, no more than solid brick. As a matter of fact, in a well managed job a hollow-tile brick-veneered wall may run less than solid brick in cost.

To save on labor run the face brick up a few courses ahead of the tile backing, and use wall-ties to unite facing and backing. Leave the ties sticking out; as each course of tile comes up to the right height the ties can be bent to catch the course at the right level.

When running a gang of masons, put your best and speediest men on the face work, because, of course, face work goes much slower than the tile backing. The latter fills up the wall quite rapidly owing to the size of the blocks. There is some psychology in keeping the facing well ahead of the backing; the effect of an unbacked wall on the tile layers spurs them on to work faster, so you get up a sort of competition between the front and back of the wall.

Many contractors employ the same men to back up a wall that they use to lay the face brick. This works all right when the men take hold well, but they should lay the back-up tile much faster than they lay face brick, and it is up to your foreman to see that they do.

Of the cheapest and easiest built lintels for the windows of a brick house those made of hollow tile, reinforced with concrete and steel rods are probably the most convenient to use. A quick and easy way to make the lintels is to stand a pile of tile on the ground end to end, pier fashion; place reinforcing rods in what will eventually be the under-cells (when the lintel is in place on the wall), and then fill all the cells with concrete. Usually two rods are used except when the increased span requires more.

After the lintels are set perfectly hard, they are lifted in place on the wall like a slab of stone. This is just rough work but the lintels are excellent and cheap to build; probably cheaper than reinforced concrete lintels because no forms are required.

Often owners who want to save money

without hurting the job can be talked into using brick sills in their brick houses, instead of cut-stone sills. Not only is a saving of material made but often time is conserved when a job is in a hurry and there is no time to wait for cut stone.

In this case it pays to have your laborers pick out the good, straight brick from the pile for sills, and have them delivered on the scaffold right where the sill-builders can pick them up quickly and lay them right in place. It has also been found advantageous to break in one or two bricklayers on sills and let them lay all the sills on the job. There is no particular trick about it, but a man who has had experience in one line of work can usually do it better and faster than any other mechanic.

Considering brick work again, and facework in particular, nothing will lose money for a contractor faster than getting slow men on the corners (leads). No bricklayer in the middle of the wall is going to push the corner men and if the latter slow down the middle men will just naturally go a little slower also. To offset the extra care needed to get corners plumb and level and set the gauge properly for the balance of the wall requires mighty speedy and accurate bricklayers at these vulnerable points. As they have more puttering to do and yet must keep their leads well above the middle of the wall, haste is Accuracy counts tremenessential. dously. Laborers should be required to keep the corners liberally supplied with



Your best men on the corner leads will make money for you, contractors, if they are properly alive. When things go wrong in a military company the captain gets after the lieutenants. If work goes slow on the wall, get after your corner men who set the gauge



Something must be wrong here; four men, but only two working. How many fours have you on a two-man job? It isn't necessary to drive men to get the best out of them, but they should be so placed that each man has a full day's work to do. Otherwise, dollars are wasted, and this shouldn't be in these times of increased efficiency in all lines

material and your very best men should be given these positions.

When the boss goes on the job and finds several mechanics standing about waiting for others to complete a task or get out of the way, he is sure something is wrong with the machine. Men don't have to be shoved at top speed all the time to get a good day's work out of them, but they certainly should not



One man on a one-man job. Unlike the preceding illustration, here is efficiency, and as long as the cement finish for this concrete porch floor is delivered fast enough by the "tender" this man will do a good day's work

be permitted to stand around and wait for anything. No matter what building operation is going on a mechanic standing idle is a mechanic too many on that particular job; he should be transferred to some other part of the work where he will have plenty of room to keep busy.

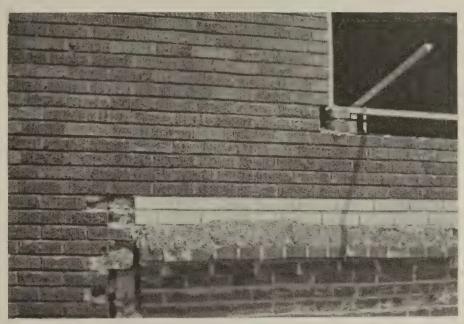
Lots of money is lost by having too many men on a job. There should be just enough to do the job speedily. Any excess over this is waste. If two men can carry a plank you should not permit four men, and if one man can carry it don't use two.

There are many chances for leaks in house building. Houses are small and

the work is more puttering than in commercial buildings, flat buildings or stores. But you must look out and not let your men putter over trivial work. Even though honestly trying to do the job in your interests to best advantage, men often lose time for their employer simply because they don't use their heads.

If you go on a job and find your foreman standing around watching the men work, he isn't the man for the job. A foreman, when he isn't measuring or planning ahead, should be right at work with his men. There is no more important man on the job, and no man who has more to do, or who should keep more busy.

Enameled Brick For the Porch



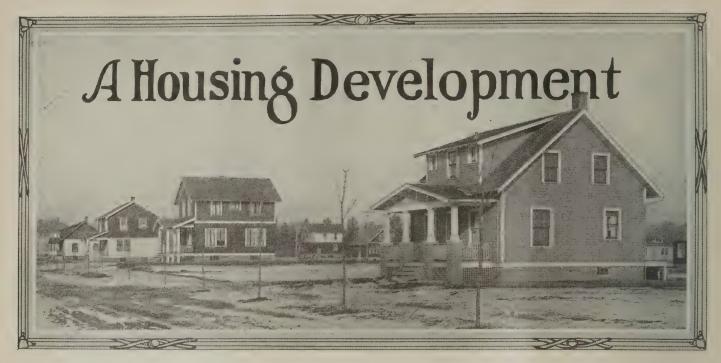
By laying a double course of enameled brick where a porch floor intersects a wall, you make a hit with the housewife. The enameled bricks protect the wall when the porch is scrubbed and are easy to keep clean. Keep these points in mind when building. The evidences of your forethought in these things cannot be hidden and you will soon acquire a valuable reputation as a careful and upto-date builder.

The photograph shows the enameled brick set and ready for the porch floor to be built up to them.

THE VALUE OF UP-TO-DATE EQUIPMENT

This automatic dump truck not only saves money, but it is a good advertisement for its owner. The builder who employs up-to-date equipment, inspires confidence in his ability to do a job quickly and well.





ONE of the outstanding features of the industrial housing developments in America is the enthusiastic manner with which they have been received by the workers. We are rapidly approaching the time when labor disputes will involve not only hours and wages. but will also include housing. It is a question of but a few years at most until every industry in this country must be prepared to offer its workers an opportunity to own their own homes.

Some far sighted employers have anticipated this movement and have provided their workers with a means of satisfying their want. Other employers, however, seem to look upon industrial housing as some sort of a war-time fadsomething transient that is even now forgotten. They have not looked beneath the surface. They do not know that a number of progressive industries in this country were operating successful industrial housing developments several years previous to the beginning of the European war. Not rows of shacks for rental purposes, but real homes that were built by the employer and sold outright to the workers.

The idea is gaining ground every day. There are a number of new housing projects now under way and as knowledge of the idea spreads it gains adherents. It may be expected almost any day that an employer who has not provided proper housing facilities for his workers will be visited with the consequences of his help seeking occupation where conditions are more favorable. This means the bugaboo of "labor turnover" and consequent loss in production.

Considering the comparatively recent origin of the industrial housing idea it is remarkable how successful they have proven. We in America had a few European examples along this line to refer to, but conditions here and abroad were so different—more so before the war than now—that it was necessary for us to build up an entirely different method of procedure suited to our American needs.

During the progress of the war many



THE GREENHOUSE

Here potted plants and flowers are grown and used for beautifying the property

plants were forced to vastly increase their output. This meant more men. There were no houses for the men's families. Houses must be provided in the shortest possible time. This is where some of the mistakes crept in. There were not many mistakes, but there were a few. These were sometimes the fault of the landscape designer, sometimes the fault of the designer of the houses, and sometimes due to the requirements imposed by the industry promoting the scheme—there was not sufficient time to carefully weigh every point. Some of these mistakes have only lately become evident and it is deemed important that we should briefly consider them.

In many instances the lots were entirely too small. It is interesting to note that it was the depth rather than the width that was usually skimped. We seem to have learned not to jam our houses so close together that light and ventilation are impaired, but it has not been fully learned that lots must have depth and not be so shallow that there isn't really room for a clothes line, let alone the private vegetable garden that nowadays is deemed necessary by many people, and in addition to these inconveniences the man who owns a car is strictly up against it for garage space.

In other cases the houses lacked the personal touch. The designs were inflexibly standardized. The family who was to live in the house was allowed no voice in the planning. Changes, even of a minor character, were not permitted. This sort of thing breeds dissatisfaction. Of course, it is illogical to allow the purchaser to dictate just how his house is to appear with relation to his neighbor's. In other words, it is not necessary to destroy the attractiveness of a development by allowing each purchaser to build his house entirely different from every other house in the group, thus destroying the harmony of the whole, but in matters of plan and arrangement his ideas should be incorporated insofar as they are practicable.

Some of the houses were too good! This is rather a radical statement to make, but it is true. Five-coat enamel work thruout the house and the highest grade of plumbing fixtures are novelties to some of our workers, especially those of recent foreign origin. The purchaser should be given freedom in selecting some of these features. If he

desires to save some money by using stain instead of enamel he should be allowed to do so.

The purchaser should not be allowed to select a more expensive house than he is able to pay for. In the first few months he is enthusiastic and will make sacrifices to meet the payments. After awhile he will become more or less discouraged and may throw up the sponge. This promotes dissatisfaction on all sides

and provokes a result that is exactly the opposite from that desired.

Care should be used in selecting the families who are to live in the development. Intelligent, law-abiding citizens require neighbors of like character. They will not make their homes in a community that is populated by undesirable people.

As an example of a housing scheme that was carefully worked out so that its



1, 2, 3—Employes' houses built by the company. 4—Interior of the company's theater. The seats are removable and folding, so that the floor may be cleared and used for dancing. 5—One of the wards in the hospital. Strictly modern notions would wish the trim more simple to avoid collection of dust. 6—A private room in the hospital that compares favorably with those of city hospitals

NATIONAL BUILDER

MEMORANDUM OF AGREEMENT

MEM	ORANDUM OF AGREEMENT, Made thisday of
BETY	y year one thousand sine hundred and WEEN, BUCHANAN LAND COMPANY of Bochsans, Michigan, a Corporation duly aw d under and existing by virtue of the laws of the State of Michigan, party of the first pa
of the hereis	mafter referred to as the Seller, and. Village of Buchanan is the County of Berrien, State of Michigan, party of the second parafter referred to as the Purchaner MERERAS: The Seller is the owner of certain real state which it desires to sell and wh quechaner desires to bay. Therefore, the parties hereto agree as follows:
	. The Seller, in consideration of the aum of
	DOLLAR
cerla	to it duly paid as hereinafter specified, hereby agrees to sell to the Purchaser all of it is piece or parcel of land situated in the Village of Buchanan, County of Berrien, State igan, and same particularly known and described as follows, to wit:
2	The Purchaser hereby agrees to pay to the Seller said sum of
as fol	llows: DOLLAI
on de	livery of this contract, and balance in equal monthly installments of

employe of the Clark	Equipment	Company,	then and	in that	event	such	portion e	f the	8031	•
	dolla	are as was	represent	ed by ti	se ratio	whiel	the tim	e elape	dne l	ь

dollars as was represented by the ratio which the time elapsing b
tween the date of this contract and his death bears to five years will be automatically credified.

and shall keep the same in as good conditionant thay are at these, between the same and a second conditionant thay are at these paid as a diff and the same and t

11. It is mutually agreed that this contract is not to be assignable by the Purchaser exor by the written consent of the Saller.

12. This contract shall be binding upon the heirs, executors and assigns of both parti-

Witness		BUCHANÁN LAND COMPANY.
		Ву
Vitness		PURCHASER

ose half (§) of ose (1) percent on the first sky of each and every ments during the life of the contract, and the balance to the principal. The Purchaser has the right, at his option, to pay have in installments than above provided for, and to pay the whole of the balance at any time remaining unpaid on this contract, at any time before the same by the terms hereoff becomes due and payable. The Purchaser also agrees to pay all taxon and assessments that shall be taxoff or an

3. It is mutually agreed that the Purchaser shall and will keep the buildings exceed as to be rected upon the Insida shows contracted for immured agrinate from or change by five, in day organized insurance compastes acceptable to the Seller, and in amount approved by the Seller with loan, if any payable to the Seller. The policy, or policion, of insurance shall remain with in the contract to the policy of the contract shall be provided by the Seller and the contract of the contract, and in case any premium on such insurance or any and of the contract of the contract, and in case any premium on such as the contract of the contra

d. The Seller agrees that upon the completion of the payments as provided herein, it will it own cost and expense execute and deliver to the Purchaser or to like being, ascentors, or an aigna, a good and sufficient conveyance in fee simple, of and described lands, free and clear or aigna, a good and sufficient conveyance in fee simple, of and described lands, free and clear or the date hereof, by or through the action or sugiginess of the Purchaser, his lairs, ascenders, or ansigns. It is mutually understood and agreed that the said conveyance in fee simple, will can be approximately an expension of the conveyance of the conveyance

the front wall thereof located
feet from the public street, and that a strip
shall be reserved for and dedicated to an alley, extending from
Street, parallel to
Street and.
Street.

The Purchaser agrees to make no alterations or additions to the buildings erected or be erected on said described land except by the written consent of the Seiler.

helrs, executors, or assigns, of the premises and inside referred to in this contract shall be subject to all remonshie restrictions and regulations which may be made from time to time by the Sel er, with the provision, however, that no such restrictions may be extended for a period of mor than five (5) years from the date of this contract.

 It is mutually agreed that at any time when under the provisions of this contract the principal sum named herein has been reduced by initial payment and monthly installments to....

DOLLARS.

se Seller may at its ostion deliver a deed to the purchaser and take from him a mortgage for the lance then due.

8. It is mutually agreed that, if at the end of five (5) years the Purchaser of the support.

balance then due.

8. Hi smutually agreed that, if at the end of five (5) years the Purchaser of the property covered by this contract has not conveyed or assigned his interest in such property or in this contract and if he is and has been continuously an employer of the Clark Equipment Company,

then and in that event, the sum of . DOLLARS, will be automatically credited on the principal amount named in this contract.

It is mutually agreed that if the Purchaser should die before the expiration of five years from the date of this contract without having conveyed or amigned his interest is such property

This agreement is a copy of the one upon which the transaction is based. The original is printed in large, easily read, type.

success was practically assured before any houses were built, we have selected that of the Buchanan Land Company, a subsidiary of the Clark Equipment Company, of Buchanan, Michigan.

The project was first submitted to the employes in the form of a questionnaire to be filled out by those interested. When the questionnaires had been returned, a meeting was called in the company theater and by the aid of talks, sketches and lantern slides the scheme

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was explained. By these means a line was given on how many houses should be planned, how expensive they should be, and much data on the desirability of the applicant was at hand.

The company bought a tract of land, subdivided it into large lots based on the

alleys, deep set building lines, and with permanent building restrictions to protect the purchasers as a whole.

One of the novel features of the project was the freedom that was allowed the workers in selecting their plans. The only restrictions that were imposed were that the house should not be freakish and that it should not be too much of a burden on the worker's pocketbook. He could obtain his plans from any source and the company would build for him.

In selecting the plan it was found that the intending purchaser almost invariably chose a comparatively large house. He declined to be restricted to four rooms. He wanted room for his expanding family and for social purposes.

Another feature of this development is that the principle of amortization is employed in paying off the mortgages on these houses. (The amortization idea was discussed in the May issue of NA-TIONAL BUILDER.) In fixing prices the company added 100% to the actual cost of the lot and 5% to the cost of house. This was done to head off speculators. At the expiration of about five years this excess valuation is applied to the credit of the purchaser, provided that he has continued his payments. Initial payments varied according to the means and the responsibility of the purchaser, but averaged about 10% of the value of the The installment payments property. amounted to 1% per month.

A formal agreement was drawn up which provides for a description of the property, terms of payment, insurance, and all important details incident to the transaction. This agreement is reproduced in connection with this article, as it is an unusually clear and lucid re-

cital, free from many of the technicalities which often becloud such a document.

In connection with its housing development the company has also erected a theater and a hospital. In regard to the former it is interesting to note the company's experience in providing amusements for the workers. A vaudeville show was imported from Chicago and free tickets were distributed among the employes of the plant. That night the

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QUESTIONNAIRE

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н	or maky rooms?
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Ģ	
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A.	y other source of income?
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He	w many children under 18 years sid?
D.	you keep bearders or ledgess?
He	w many ways corners in your family?
w	rold you be interested in buying a new bosse or lot on easy payments?
De	yes own a Liberty Bond?
Ha	to you say stock in this Company?
Ηo	to you say dobts or other obligations that would make it difficult to make payments?
No	r lorge a first anch payment can you make?

This questionnaire offers a means of determining the responsibility of possible purchasers of houses

actors played to empty seats. Next time regular admission was charged and the house was packed. American workers will not tolerate anything that smacks of paternalism.

The hospital is an example of what can be done in the way of remodeling an old building. This was transformed into an excellent hospital with 12 beds and an operating room equipped for the performance of major operations. Additional beds have been provided for in case of unusual demands.

The general contract for the development was let to W. A. Caven, of Sturgis, Michigan, on the cost plus basis, with the provision that material could be purchased by the contractor or by the Clark Equipment Company, depending on which could obtain the lowest quota-

The contract for grading, sidewalks, streets, etc., was let to the Berrien Construction Company.

The cost to date of the entire operation has amounted to about \$225,000. Forty-five houses have been erected.

Minus A Bed Room



THAT a bungalow without a bed room I is entirely feasible is illustrated by the accompanying plan. The use of wall beds permits the space that would be required for bed rooms to be used for a reception hall and for giving more space to all of the other rooms. The plan might be further simplified by doing away with the dressing room shown at the upper right hand corner of the plan; this portion could be used as a kitchen porch.

The bed between the dining room and the dressing room may be used either way. On stormy nights the bed could be in the dining room and at other times in the dressing room.

The closet in the living room is desirable for clothing, but there is considerable space at the rear of the wall bed closet that may be used for this purpose.

By the use of the wall beds this threeroom plan is made the equivalent of a five-room one, and the resulting saving in cost gives an opportunity to incorporate a reception hall.

This reception hall is a highly desirable feature that can be employed to good advantage in many bungalows. It forms somewhat of a barrier between the entrance and the remainder of the house and adds to the privacy.

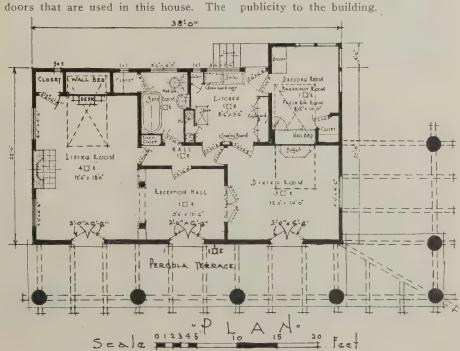
Note the large number of French

doors from the living room, dining room and reception hall opening onto the pergola terrace, are all of this type, as are the ones between the reception hall and the dining room. The arched opening between the reception hall and the living room could also be omitted and French doors used instead to good advantage. French doors give an "open" feeling similar to that of an arch, but are often preferred to the arch because drafts and so forth are more easily controlled. French doors make a room in which they are used appear larger.

It should be remembered that a room which is to be used for sleeping quarters should always have closets or other means for putting away clothing and so forth. Of course, if the wall bed closet is deep enough it may be used for this purpose.

Unfortunately it was impossible to obtain the name of the designer of this bungalow.

It is the policy of NATIONAL BUILDER to give due credit for buildings that are illustrated in its pages, but in cases such as the present one it is felt that the lack of knowledge of the authorship should not outweigh the importance of giving publicity to the building.



Reducing Building Costs

THE MOST important problem before the builder of today is how to build in the most economical manner. This problem must be attacked not from one angle, but from several. In the first place the builder must concern himself with the cost of erecting the work. Skilled labor is scarce and wages are

high and advancing. In some communities sufficient tradesmen simply cannot be obtained, and with the tide of building activity steadily rising it will be a matter of but a few months, perhaps weeks, until our resources in men will be exhausted. What then? Shall we plug along at half speed with work con-

stantly piling up and going to pot because we can't handle it? Not by a jug full! This country has somewhat of a reputation for doing things, and one of the principal reasons for this reputation is due to our employment of machinery.

If anybody thinks for a minute that



See Plan No. 1



See Plans No. 2



See Plan No. 3

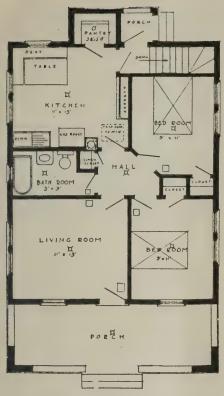


See Plans No. 4



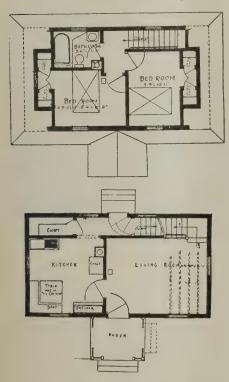


See Plans No. 5

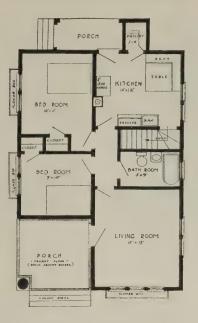


1—A well designed 4-room stucco bungalow. It has no separate dining room, but the buffet dining seat and table in the kitchen fulfills this requirement

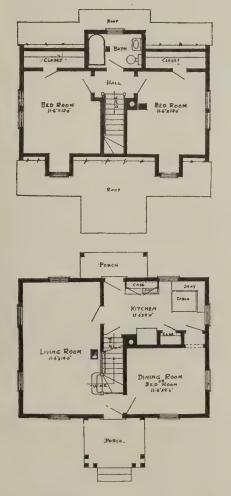
the progressive builders of this country are going to lie down on the job, they had better get their roof thatched! If we can't have men we'll use machinery. We'll use the skilled men to lay out the



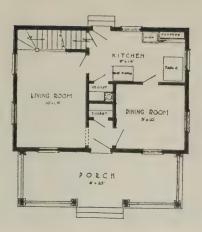
2—A 4-room cottage with Dutch colonial lines. The second floor arrangement is especially good. Note that each bed room has two closets

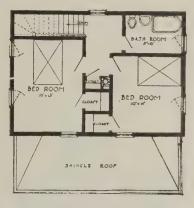


3—A clapboard bungalow with four rooms. The bed rooms would have better ventilation if they had additional windows in the walls next to the porches



4—A splendidly designed 5-room house. The winders in the stair are undesirable, but are excusable in such a small house. The hall is about the last word in compactness





5—A 5-room plan with two treatments for the front porch. The small covered porch with terraces at each side is growing in popularity

work—make a scratch-boss of every one of them if necessary—and every possible piece of work will be done by machinery. Of course we haven't quite reached the point where we can feed materials into one end of a machine and have it come out a house at the other, but there is a vast amount of tedious work that can be handled by machines.

The force of men required on a job can often be cut in half by the builder who has an up-to-date plant. Wood working machinery, mortar mixers, concrete mixers, metal concrete forms, metal brackets for scaffolding, stucco machines, floor surfacers, hoisting rigs, building levels and all of the hundred and one appliances that have been developed for speeding up work and cutting costs are standing by for orders. They are ready to reinforce the units of the builders' army. The builder who doesn't employ them is going to lose a battle. He will have just as much chance competing with his more progressive fellow builders as would a raiding party attacking a "tank" with bows and arrows.

There is yet another phase of the problem to be considered. If a building is to be put up economically it must be planned accordingly. If the rooms are larger than necessary, if the ceilings are too high, if floor space is wasted, if unnecessary frills are added, if the plan is





See Plan No. 6





See Plan No. 7





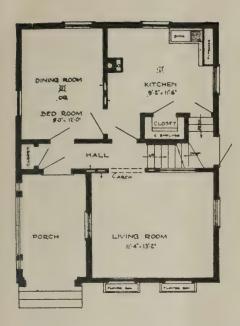
See Plan No. 8

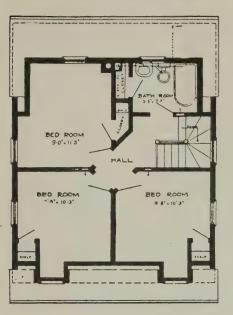
irregular, chopped up, and full of corners and angles, the house is not going to be an economical one to build.

Some of us have been astonished at the low cost of the houses that have lately been built by industrial plants for housing their workers. Of course, some of this economy was due to the fact that these housing developments used enormous quantities of materials which were bought in wholesale lots, but the principal saving was due to labor saving machinery on the job and to the fundamental economy of the plans for the houses. These plans were worked out by skilled men, men who had years of experience behind them. Older developments in both this country and abroad were studied, plans were revised and checked and boiled down until the completed plans represented the composite idea of scores of trained minds. The

illustrations which accompany this article represent houses that were built from just such plans, and they are full of suggestions and ideas that can be carried out in either individual houses or in groups, such as this one.

The industrial housing development of the Fairbanks-Morse Company at Beloit, Wisconsin, has already been given publicity by NATIONAL BUILDER, but recent photographs showing the completed

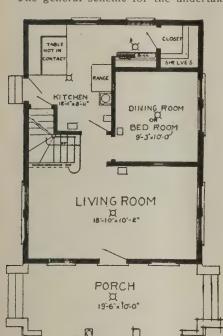


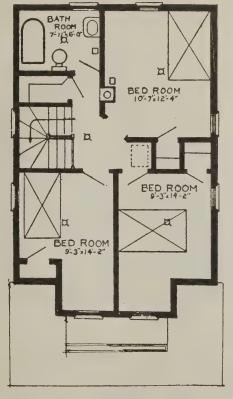


6—A six-room house with an entrance hall on the first floor. The doors to the bed rooms are ingeniously placed

houses have been obtained and it is felt that the excellence of the plans and the designs merit further discussion.

The general scheme for the undertak-





7—A six-room house. The arches on the front porch of the stucco house are a pleasing variation from the usual treatment. The large linen closet on the second floor is a most desirable feature

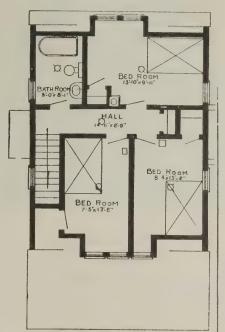
ing embraces the construction of some 350 houses, covering 63 acres of ground. The site is just on the outskirts of Beloit and overlooks the winding Rock River, the banks of which are heavily wooded. In connection with the housing development will be churches, schools, stores, a theater, band stand, parks, athletic field, and everything that goes to make a complete model village. The undertaking is engineered by the

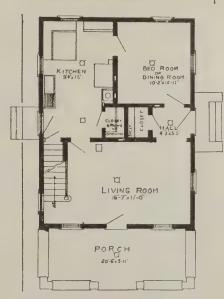
Eclipse Home Makers, a subsidiary of the Fairbanks-Morse Company. The architects were George B. Post & Sons, of New York City.

The development has been laid out with winding streets, which follow the lines of least resistance, thus doing away with the filling and grading that is necessary where streets are laid out in right angles on rolling ground. The curved street is also more attractive and shows

up the individual houses to much better advantage than does the right-angled street subdivision.

The houses are all of frame construction covered with stucco, shingles, or wide clapboards. The clapboards are rough sawed, painted white. The foun-





8—A six-room house with a rather crowded second floor. In many cases it would be desirable to leave out the partition between the two front bed rooms, making one large room

dation walls are of solid concrete. The cellars have 7-foot clear headroom. Wash tubs are included in the cellars of the larger houses. All the houses have furnaces equipped with water backs for heating water in winter. Gas waterheaters are used for heating water in summer.

The houses vary in size from 4 rooms to 8 rooms. Living rooms range from 150 to 210 square feet in size. Dining



ROOF

UNFINISHED
OTORAGE

CLOSET

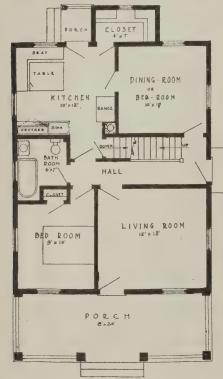
ROOF

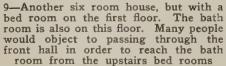
BED ROOM

BED DOOM

ST. P. BED DOOM

See Plan No. 9

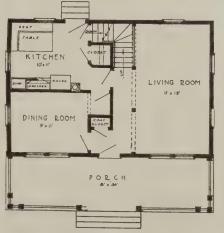


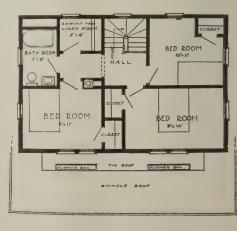


rooms from 100 to 140 square feet, and kitchens from 90 to 115 square feet. In the four-room houses buffet corner seats are built in, and with the table serve as a dining space. This scheme doubtless has some advantages in cost over the customary buffet dining alcove, which has the seats on each side of the table. All first floor rooms have ceilings 8 feet 4 inches high in the clear. The first floor trim is stained. All trim and other mill work, both outside and in, is of

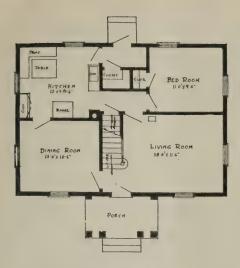


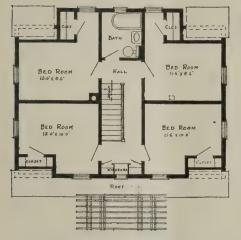
See Plan No. 10





10—A homelike 6-room house. This plan is somewhat more "open" than are some of the others. Considerable spaceon the second floor is devoted to the hall. The sewing room would be appreciated by some women





11—An 8-room house with a bed room on the first floor. A remarkably compact house with plenty of closet space

standard type, thus giving the advantage of economy over a large variety of details.

The bed rooms range from 110 to 150 square feet in area. Their trim is finished in white enamel and all have cross ventilation. The second story ceiling heights are 7 feet 9 inches clear. Where roofs cut into rooms, the least height is 5 feet clear. Bathrooms are completely equipped with three fixtures.

These houses are sold to the workers on a very liberal installment plan. It is required that the buyers carry full fire and tornado insurance on their homes, the premiums for which are payable monthly with the installment on the house. Certain restrictions are made a part of each deed so that no property owner will be permitted to use his property in a way that will annoy his neighbors

These plans and photographs contain many valuable hints that may be employed by architects and builders for individual houses as well as for large developments, similar to this one. In many cases a few minor changes in one of the plans will allow the entire character



See Plan No. 11

of the house to be changed in appearance. By combining some of the features of each house and incorporating them into one plan, it is possible to obtain a solution that will satisfy almost any individual demands that may be made. That is the spirit with which all of the buildings shown in NATIONAL

BUILDER are presented. They are offered as guides, with no pretense of satisfying every individual requirement that may be encountered. It is of course impossible for any group of plans, no matter how studiously prepared or selected, to cover every point that a person may demand for his own house.

A Tool Box On Wheels



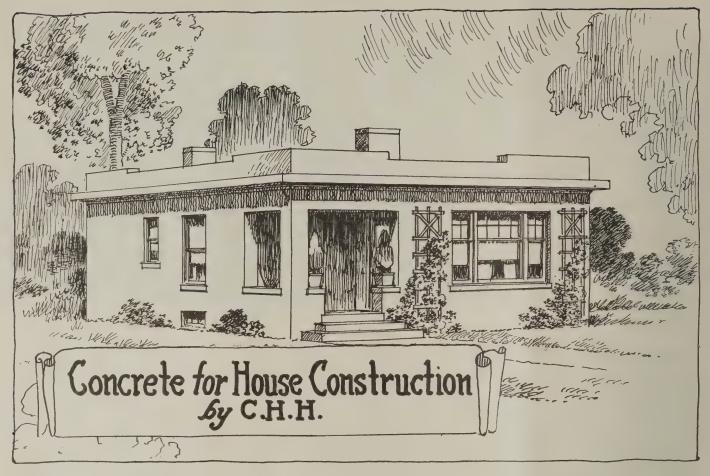
Every convenience to save labor and time is becoming increasingly important.

Time and labor in moving from job to job may be saved by placing the tool box on wheels.

A tongue on the front end permits the toolbox to be attached to the rear end

of a truck or wagon in the same manner as a trailer.

This is not only a great convenience in moving from job to job and saving time, but also does away with the heavy lifting which is required when the old type of tool box is used.



AMONG the things we have learned from our late experiences is that makeshift construction is very costly in the end, no matter how cheap it may seem in the beginning. Whatever the materials used, build the best they will allow.

There is a difference between a house and a home. The commercial activities surrounding the house make it largely a buying and selling proposition. Not so, however, with the home, for the home means an expression of personal ideals and is planned usually with the view to permanent occupancy by the person whose ideals it expresses.

Not only is there shortage of homes for individual persons, but a shortage of homes and house-rooms for the people, which, of course, includes a serious shortage of good living quarters in industrial centers. Nothing adds more to the efficiency of industrial workers than securing to them the comforts and conveniences of a "home." In order that these shall be truly achieved, the humanitarian and economical aspects of the workingmen's housing problem must be considered and solved as nearly as possible.

Quarters that are to be used for residence purposes must be sanitary and easily kept so; they must provide all reasonable comforts and should furnish safeguards against fire, earthquake and

tornado. From the investor's standpoint, construction should be such as to
call for the least possible cost of maintenance, which means all kind of upkeep. The permanent and solid character of a concrete house, whether it be
built after some monolithic system of
construction or whether it be built of
building block, precast slabs, brick or
other units, is rotproof, ratproof, fireproof, windproof and secure against depreciation that comes from any kind of
occupancy.

National Builder readers are requested to send in descriptions of practical methods that they have used and kinks that they have solved in building with concrete.

The requirements of many industrial workers make it necessary that homes provided for them be proof against the neglect and abuse to which they too frequently subject their dwellings. Concrete being a dense, impervious material, allows no cracks nor crevices in which vermin or filth may lodge and find permanent refuge.

Concrete houses are cool in summer and warm in winter. This is particularly true of those types or systems of construction in which the walls are provided with air spaces because these air spaces tend to insulate exterior from interior and thus prevent rapid or extreme temperature changes.

In the early days of the concrete house there was a lack of appreciation for its architecturally artistic possibilities. This was probably due to the fact that the merits of concrete had been well sold to the intending home owner in advance of ability to deliver him what he wanted; in other words, architects had not been properly schooled to the merits and possibilities of concrete and therefore were unprepared to gratify a client's desire for this type of structure. That situation does not prevail today because architectural colleges have for a number of years been training their students to express house design in concrete. Early so-called architectural efforts in concrete, as far as the house went, had an undesirable monotony from the artistic standpoint. Today the reverse is true. Proper appreciation for decorative effect in harmony with the material and a realization that concrete is itself a distinctive building material and not a substitute for any other building material, has resulted in design which expresses individuality and character.

There are thirty or more so-called systems of construction, many of which are the subject of patents whereby concrete may be, and has been, applied to house construction.

The speed of construction is largely a matter of equipment, and equipment may be considered to include the ability of the contractor to so systematize his work, through experience, that time and

labor required are reduced. The actual quantities of materials involved in the construction of a concrete house is small. Most of these are a local product, so long-haul transportation affects little, if any, the final cost or speed of construction.

Many form systems have been developed which permit such interchanging

of forms as to avoid the monotony which results more or less from duplication of design.

Concrete structure involves, in the main, the use of a maximum amount of unskilled labor. Good carpenters are needed for form construction, but on the actual concreting the bulk of labor is of a common class under a skilled foreman.



Unit construction method. Houses are painted in shades of green. Doors are red clay tile. Shutters are green

Concrete block bungalow, stucco finish. Blocks having air cells were used for wall construction



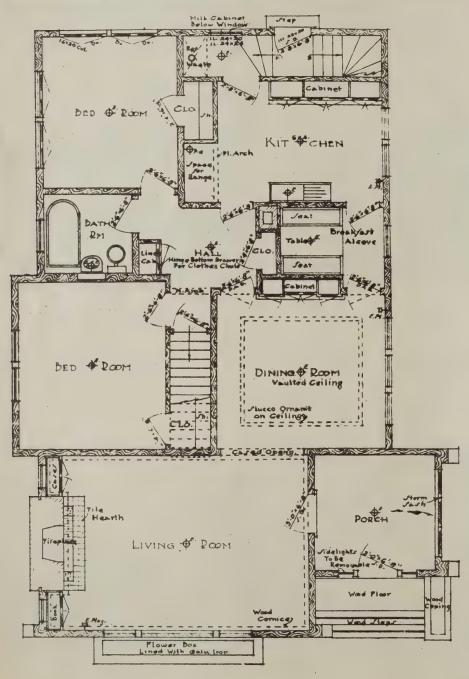
Concrete block house in which a type of block providing continuous air space in the wall was applied. The blocks have a special face that appears like cut stone

Concrete bungalow in which one of the recently developed systems of applying stucco inside and outside of a previously erected skeleton was applied



Concrete houses built on the pre-cast unit system





A Successful Builder

ONE of the most successful of the younger builders of Milwaukee, Wisconsin, is William C. Keller. His operations have been principally confined to the newer residence districts of the western portion of the city, and a large number of the more attractive buildings of that section have been erected by him.

Mr. Keller is one of those far-sighted builders who did not stop operations during the war period. His business was of course greatly curtailed, but he was resourceful enough to keep something moving along most of the time. He realized that if he gave up entirely that he would lose touch with the market and that when things began to hum again he would be unable to take full advantage of his opportunities unless he had kept himself fully informed about building conditions.

He managed to keep a small crew plugging away all last winter when building elsewhere was almost stagnant, and now when building is again on the upgrade he is ready for it.

The houses designed by Mr. Keller have exceptional merit both from their practical worth and for the good taste shown in his designs. His houses are not spectacular in appearance, but carry a certain air of charm and dignity that is not often shown in small speculative buildings.

The workmanship and materials that go into these houses are of the best. Mr. Keller maintains that no one can skin a job and get away with it for long. The jerry builder may be apparently successful for awhile, but he eventually reaps what he sows.

The accompanying drawings and photographs illustrate some of the latest work of Mr. Keller. No. 1 is a 5-room bungalow with an enclosed living porch which is almost the equivalent of a room. The porch sash may be removed in summer, thus making it an open porch. There is also room in the attic for an additional bed room if it is desired. The placing of the dining alcove in the space that is usually reserved for a pantry is unique. The lower portion of the linen cabinet has a hinged flap opening into the soiled linen chute in the basement. Many women prefer the range set into a niche as is shown here. The low ceiling over the range should have a register vent so that the heat and odors of cooking may be rapidly carried from the kitchen. If it were desired to utilize the attic space for living purposes, some people would prefer to reverse the stairway, starting it from the living room. Note the large closets and



the many built-in features of this house. The dining room has a coved plaster ceiling and the living room has a wood cornice to match the trim. The exterior is well worthy of study. It is a simple, straightforward piece of designing. The doorway with the slight curve in the roof above is cleverly handled. The rough-sawed clapboards, stained,

to No. 1, but the plan is noticeably different. The living room, twenty-five feet in length, is a striking novelty in a house that is built to sell, but it is due to these very differences that Mr. Keller's houses are usually sold before he can get the roofs on them. In this plan it is intended that the gas range be placed on the rear wall of the kitchen.

The interior walls of the porch are finished with siding. The exterior of this house partakes of the desirable qualities of the first house described. The doorway is just a trifle "architectural" for a small house. The other treatment is more suitable.

These houses are well supplied with built-in fittings, as Mr. Keller has found that the more conveniences that he builds into his houses, the easier they are to sell. It gives him an especially good talking point to use for prospective buyers who are just beginning house-keeping, as he can point out the fact that they do not need to pay out so much to the furniture dealer for buffets, bookcases, kitchen cabinets and so forth, that may or may not fit in with the house. Properly designed built-in furniture also saves housework, as it avoids "dust catchers."

It should be noticed that the photographs show these houses reversed from their positions as shown in the plans. This does not impair their value as references and is mentioned merely to avoid confusion. It was not considered necessary to show the basement plan of house No. 1, as its basement is almost exactly similar to the basement plan of house No. 2.

The minor details, such as flower boxes, trellises, and so forth should be studied carefully, as much of the good appearance of the exterior is due to their

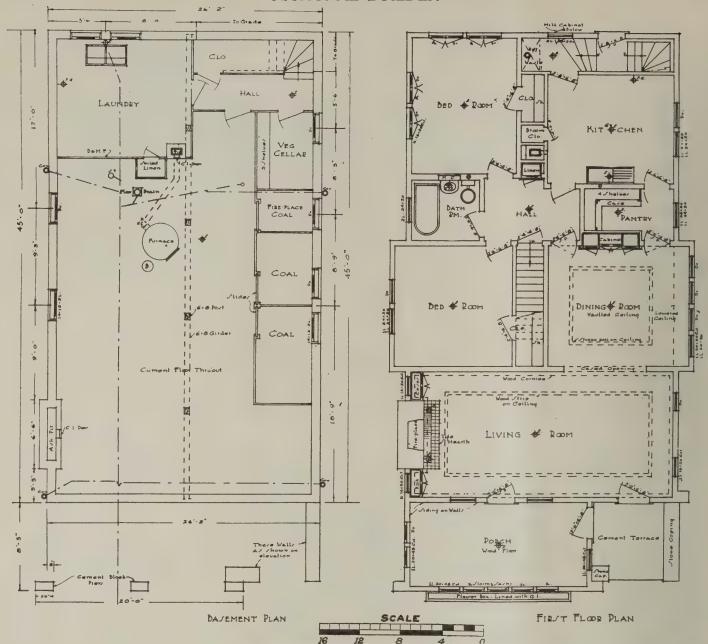


and the white trim are very satisfactory, and the flower box along the front and the trellises finish off the whole.

The exterior of No. 2 is quite similar

If it were desired to use a coal range it would be better to place the broom closet next to the linen cabinet and move the chimney toward the rear of the house.





use. The terrace treatment of No. 2 gives the house a distinguished appearance that immediately sets it off from its neighbors as offering something different.

In the plan of No. 2, it will be noticed that the breakfast alcove of No. 1 has been replaced by a serving pantry, and that the arrangement of the kitchen equipment has been altered. This kitchen has no cabinet for dishes and cooking utensils, as the cabinet in the serving pantry is considered sufficient for this purpose. This, of course, is largely a matter for the housekeeper to decide, if she wants a cabinet in the kitchen it can easily be provided.

A plan of the No. 3 house is not available, but if it is as pleasing as the exterior indicates, the buyer has no kick coming.



One Trash Pile Inside of the Other

AFTER remodeling our house, two ugly scrap piles were left in the back yard, one of shingles and ends of laths, the other of pieces of boards and studding with remnants of tin from the

trash piles; and second, the mission-style woodhouse which was built to match the house. This woodhouse was made of odds and ends of studding, lined with scraps of boards, and covered on the

nothing, as my husband did the work himself. The remainder of both scrap piles was cut up and placed within this little house which is a real ornament to the place.



new house roof. These piles were very unsightly, and there seemed little prospect of disposing of them very soon, until I conceived the idea of putting one trash pile inside of the other.

The two photos show, first, the big

outside with remnants of laths. The roof was covered with pieces of tin left from the house roof. With the exception of nails and plaster, the pretty little building was constructed entirely from the scrap heap, and practically cost

The space formerly covered by the two heaps of rubbish was turned into a flower garden which was soon a glowing mass of roses, sweet peas, and pansies noted by every one who passed by.—

Mary McCrae Cultur.

How to Figure Heating and Radiation

The following table, given in the Directory and Hand-Book of the Master Builders' Association of the State of Iowa, shows the amount of radiation necessary to heat any room or building for either steam, vapor of water to the various temperatures.

All the figures are based on transmission of heat by B-T-U rule.

In each of the subdivisions shown in the table, the first column of figures is used when the temperature is to be raised from zero to 70 degrees; the second column when the temperature is to be raised from 10 degrees below zero to 70 degrees; and the third column when the temperature is to be raised from 20 degrees below zero to 70 degrees above.

Example: A room has 40 feet of glass surface and 120 feet of exposed wall surface. It is desired to raise the temperature from 10 degrees below zero to 70 degrees above zero. What amount of radiation is required if steam heat is to be used?

Enter the table under the heading

marked "Sq. Ft. Glass," follow down the column until 40 is reached. Then move to the right until the second column of figures under the subdivision marked

under the heading marked "Sq. Ft. Ex. Wall," follow down the column until 120 is reached, then move to the left until the second column of figures under the sub-

Sq. Ft.	STEAM	VAPOR	WATER	WARM AIR	Sq. Ft.
Glass	70-070-1070-20	70-070-1070-20	70-070-1070-20	70-070-1070-20	Ex. Wall
10	3.6 4.1 4.7	4.8 5.5 6.2	5.9 6.8 7.7	6.6 7.6 8.6	40
15	5.4 6.2 7.1	7.1 8.2 9.3	8.9 10.2 11.5	9.9 11.4 12.9	60
20	7.2 8.2 9.4	9.5 10.9 12.4	11.9 13.6 15.3	13.2 15.2 17.2	80
25	9.4 10.3 11.8	11.9 13.7 15.5	14.9 17.0 19.1	16.5 19.0 21.5	100
30	10.8 12.4 14.1	14.3 16.4 18.6	17.8 20.4 23.0	19.8 22.8 25.8	120
35	12.6 14.4 16.5	16.7 19.1 21.7	20.8 23.8 26.8	23.1 26.6 30.1	140
40	14.4 16.5 18.8	19.0 21.8 24.8	23.8 27.2 30.6	26.4 30.4 34.4	160
45	16.2 18.5 21.2	21.4 24.6 27.9	26.7 30.6 34.4	29.7 34.2 38.7	180
50	18.0 20.6 23.5	23.8 27.3 31.0	29.7 34.0 38.3	33.0 38.0 43.0	200
55	19.8 22.7 25.9	26.2 30.0 34.1	32.7 37.4 42.1	36.3 41.8 47.3	220
60	21.5 24.7 28.2	28.6 32.8 37.2	35.6 40.8 45.9	39.6 45.6 51.6	240
65	23.4 26.8 30.6	30.9 35.5 40.3	38.6 44.2 49.7	42.9 49.4 55.9	260
70	25.1 28.8 32.9	33.3 38.2 43.4	41.6 47.6 53.6	46.2 53.2 60.2	280
75	27.0 30.9 35.3	35.7 41.0 46.5	44.6 51.0 57.4	49.5 57.0 64.5	300
80	28.7 33.0 37.6	38.1 43.7 49.6	47.5 54.4 61.2	52.8 60.8 68.8	320
85	30.6 35.0 40.0	40.5 46.4 52.7	50.5 57.8 65.0	56.1 64.6 73.1	340
90	32.3 37.1 42.3	41.8 49.1 55.8	53.5 61.2 68 9	59.4 68.4 77.4	360
95	34.2 39.1 44.7	45.2 51.9 58.9	56.0 64.6 72.7	62.7 72.2 81.7	380
100	35.9 41.2 47.0	47.6 54.6 62.0	59.4 68.0 76.5	66.0 76.0 86.0	400

"Steam" is reached. This number is found to be 16.5 and is the amount of radiation required for the glass area.

To find the amount of radiation required for the exposure: Enter the table

division marked "Steam" is reached. This number is found to be 12.4. Add 16.5 to 12.4 and the result is 28.9. This is the total number of square feet of radiation required for the room.

STUCCO WORK

By John Y. Dunlop

STUCCO is the popular name for the ordinary covering of cement, lime and sand applied to external walls. This external covering differs from ordinary plaster in that the lime has hydraulic properties whereas ordinary lime used for internal work is a fat lime which is

but recently there has been a tendency to adopt metal lathing and in some cases to have the work done with fibrous plaster slabs which are simply fixed to the wood furrings with screw nails. A thin coating of finishing stuff is then applied to the whole, covering the joints

and rendering the surface uniform. In

this way a great saving is effected by

the use of these plain slabs. There is

no lath required and as the slabs are practically dry before being set up the work proceeds very rapidly.

Stucco as used for domestic house construction, is commonly used to improve the appearance of a poor quality of building material.

As an instance of this, a few years ago brick makers in some districts in England were able to make a very cheap brick from the refuse which had been taken out of coal pits many years ago.

These refuse heaps lay all over the country in mining districts so that by establishing a brick making plant in a central position they were able to tap many sources of supply.

This material, when ground into a plastic state, made fairly good brick for internal positions, but immediately they were built for outside work many of them crumbled away on account of not being able to stand damp atmospheric conditions. Where these bricks were used the outer surfaces were covered with stucco which was finished on the surface in two different ways.

What is called trowelled stucco is used when the surface is intended to be comparatively smooth. The finishing coat consists of two parts hydraulic lime or Portland cement, and one part very fine, clean sand.

In rough cast the finishing coat consists of washed sand, grit or gravel,



Stucco home on wood framing with metal lath

slaked by being mixed with water and allowed to stand for some time before using.

The sand which is used with the lime and cement for cement stucco should be free from clay, soot, organic matter and other impurities, and requires to be washed before being mixed if these are present. Sea sand should be avoided, as the salt has a great affinity for moisture.

Stucco work is done in two distinct ways. The first, which is known as two-coat work, consists of a first coat of coarse stuff—hydraulic lime and sand or cement and sand mixed in the proportion of one to three, and a second and much thinner coat of fine stuff, which contains only a little sand.

The three-coat work insures a truer and better surface and consists of a first coat, a second or floating coat, and a third, or setting coat.

The last coat is finished with a wooden float or a steel trowel, the latter giving the smoother surface.

On a wooden framed house it is necessary to provide a backing to which the stucco will adhere.

This is usually formed with wood lath,

STUCCO OF PICTAL LATH WITH WOOD BUARDING

FUTTO FRANK

STUCCO OF PICTAL LATH WITH WOOD BUARDING

FUTTO STUCCO OF PICTAL LATH WITH WOOD BUARDING

FUTTO STUCCO OF PICTAL LATH WITH WOOD BUARDING

FUTTO STUCCO PINISH WITH LATH

ABADDON STUCCO PINISH WITH LATH

mixed with cement or hydraulic lime in a semi-fluid state.

When the second coat is laid on the wall and is still wet the rough coat, in a semi-fluid state is thrown upon it with a trowel.

This forms a rough adhering crust, which looks best when colored with lime-wash and ochre.

In the half-tone illustration, the two examples show trowelled stucco, the smaller building showing stucco on timber framing and the larger house stucco on a brick fabric.

The timber building consists of the usual framing which in the first place is covered on the outside with building paper, then wood boarding and furring pieces onto which is laid the metal lathing and stucco.

A sketch is given showing how the window frame is set out to allow the stucco to finish flush with the outer edge and also at the section of this part is shown the key for the finish around the window frame.

This external coating is put on in three coat work and extends from the top of the damp course to the underside of the roof boarding.

In the example of concrete work, which is shown in the line drawing, the stucco is laid directly onto the blocks.

Of course these are generally grooved on the outer face to form a key for the stucco.

The inner side of the wall would be furred to receive the wood lath onto which the plaster is coated.



Stucco home on brick work, using a cheap class of brick from refuse in mining districts

In the brick fabric the line drawing shows the detail of one of the first floor windows, which has been ornamented with a varigated pattern round the jambs and soffet of the opening.

The detail of this opening shows a very simple form of construction for a window opening.

The sill is built with a slightly projecting course to throw the rain water clear of the wall and is built with good cement mortar. The jambs are built square and so also is the soffet of the two-ring arch.

With the cement stucco, before the first coat is laid on the joints of the brickwork, which are usually left rough, are brushed all over and the surface dampened. The coating is then laid on evenly and thin to cover the face of the wall.

The surface is left somewhat rough or is scratched with a few pointed laths before it sets.

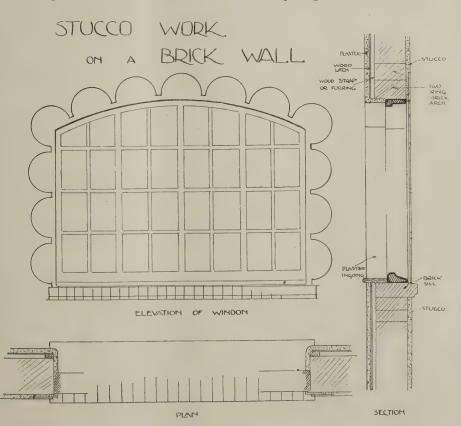
The second coat is then laid on. This coat is more for the purpose of straightening out any hollows on the face of the wall and to give the stucco a sufficient body to resist the action of the weather.

This coat is generally put on with the aid of screeds, just as in good interior plaster work.

Sometimes the screeds are narrow patterns of wood and very often a piece of wood is fixed round the window opening, the edge of which forms the screed.

In this particular case of ornamental stucco work round a window opening shown in the line drawing the first coat of the stucco would be laid on in the usual way. But immediately it was set and before the second coat was started, a wood template three-eighths of an inch thick would be cut to the window side of the line of ornamentation.

There would be one piece for each jamb and one long circle piece for the



arch, which for convenience sake might be in two lengths.

These templates are then nailed onto the first coat of stucco and the second coat and the trowelled coat worked in against the shaped edges.

When the work has set the woodwork is taken off.

This now leaves the ornamented portion with the first coat only in position.

This portion is now finished with the addition of the finishing coat, which is red tinted to match the brick sill of the window.

A great number of stucco buildings, especially those used for temporary purposes, are erected with fibrous plaster work and are quite distinct from the old method of floating the stucco on the walls with the hand float.

One can readily understand the advantage of being able to do these on the fibrous plaster bench and the lessening of the ultimate cost when the amount of time and labor is taken into account.

Fibrous plaster slabs are made from a combination of plaster of paris, along with canvas of not too hard a kind and with a suitable mesh, the two being bound together with good straightgrained and not too dry sawn wood laths.

Ornamentation and enrichment can be made in any shape or form with this material in the gelatine moulds or casts, which have been previously made by the plasterer.

Fibrous work can be adapted for any sort of work in decoration and for moulding it is especially suitable.

To make a moulding the mould is run in negative form in gelatine on the bench. When the gelatine is in a fit state the plasterer gives the gelatine a coat of tallow, after which the first coating of quick setting stuff is laid on the mould and cross stays of lath are laid on where it is thought necessary.

The plaster is then run in in a creamy state into the mesh of the canvas which has been laid on the first coat, forming a key which binds together the two coats and ultimately results in the positive shape of the cast mould required.

These mouldings would be ultimately screwed up to the timber fabric and touched up in position when the plain surfaces were being coated.

CLOSET ACCESSORIES

That as simple a thing as a hook to hang clothes on is capable of development will be noticed in the various devices of the "pull-out" order that give comparatively small closets or receptacles a much greater capacity. There is an array of styles in hangers that make the room for closets adequate, save space and money and give satisfaction all around. Get posted on these.

A California Bungalow

BUNGALOW plans show more varieties of treatment than do those of any other type of house. With the ordinary house of two floors the arrangement is more or less settled beforehand. It is merely a problem of making it large

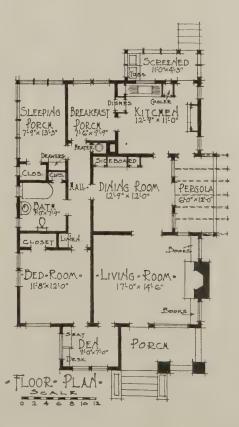
floor, they may be shuffled around in a manner similar to shuffling cards.

One of the striking features of this bungalow plan is the fact that it has but one bed room although it seems to contain about every other sort of room and



J. B. Peppin, Architect and Builder

or small as the case may be. The sleeping rooms must be located up stairs and the others down, and very little variation from this form is possible. In the bungalow plan, however, there are few restrictions. All the rooms are on one



porch that can be thought of. This is not said in any spirit of criticism, because it is well known that plans are usually suited to the needs of the person who owns the house. The average family, however, would usually demand at least two bed rooms, or at any rate, wall beds in some of the other rooms that could be used to supplement the single bed room.

It desired the sleeping porch and the breakfast porch of this plan could be easily combined to form a bed room. This bed room would have two outside walls for cross ventilation and would be very desirable.

This plan is well supplied with closets and other built-in features. The placing of the hot water tank in a closet off the back hall is a good idea. The entire side of the dining room is glazed and opens onto the pergola porch at the side, this should make it a very attractive room.

Clinker brick is used in the chimney and the porch pier. The walls are shingled down to the water table and below that they are of rough sawed siding. The finish is stain with white trim.

This bungalow was designed and built by J. B. Peppin of San Leandro, California.

The Chimney as a Fire Hazard

IN America the chimney is the most prolific cause of dwelling house fire losses. According to insurance records defective chimneys are responsible for more than twenty per cent of such fires. By removing this hazard we do away with one out of five of our disastrous fires, with a resulting saving of life and possessions that cannot be measured in terms of money.

Chimneys should never be constructed of ordinary sewer tile nor with bricks

side of unlined chimneys should be struck smooth and not plastered. Such plastering rapidly flakes off under the action of flue gases and often tears the mortar out of the joints, thereby weakening the walls, and sometimes allowing the passage of sparks, etc. A weak draft is often due to open joints.

Flue linings should be made of terra cotta or fire clay tile without lipped joints and should have walls not less than one inch thick. Ordinary sewer

should not be closer than two inches to the chimney. Where chimneys pass between joists, etc., the brick should be plastered on the outside with a coat of cement mortar one-half inch thick and extending at least a foot above and below the joists.

Chimneys should never rest on wood nor on unprotected metal supports: the former will shrink and cause cracks in the chimney and either material offers small resistance to fire-steel begins to lose its strength at a temperature of only 500 degrees. No supports other than fireproofed metal or masonry should be used and they should extend from the ground up-brackets are dangerous. For ordinary chimneys for two-story houses and average soil, the footing should be made of 1:2:4 concrete, 12 inches thick and 8 inches wider than the chimney all around. The footings should always be carried to the level of the adjacent house footings and below frost line in any

Most Durable Construction Bricks Projected Over 2006 Partition Stud la Grand With Chinney, & Mails Driver In Joints Joist Resting On Chinney Joist Supported By Headers PLAN PLAN FILE FILE LINING On Chinney Fig. 12 Fig

A MASONS' BUCK

This illustrates a masons' buck for scaffolding that is rapidly taking the place of the saw-horse type. It is called a ring, and as it has no outstanding legs it takes up comparatively little space when not in use. In moving from job to job about twice as many of these can be hauled at a load as is possible with the saw-horse type.

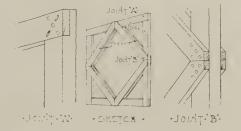
The rings are five feet square and the joints of the two-by-fours are halved and spiked with 16d clinch nails, tightly

laid on edge. Unlined chimney walls should be at least eight inches thick. Lined chimneys may have four-inch walls provided that not more than two flues are built in one open space and that additional flues are separated by four inch brick withes well bonded into the chimney walls. Stone walls should be at least four inches thicker than corresponding brick ones. Cement blocks not less than four inches thick may be used if you are sure that the blocks are well made-they require conscientious workmanship. Some authorities recommend that all such blocks be reinforced with steel to prevent their cracking under temperature changes.

Chimneys should be laid up in cement mortar (one part cement to three parts sand), as it is much more durable than lime mortar, also the chimney may be carried up faster because the cement becomes strong enough to bear the weight quicker than lime mortar does. The in-

tile is not suitable for use as flue lining. If two flues are run in the same space, offset the joints at least four inches to prevent a fire in one flue from passing to the other. Linings should be set in cement mortar and carried up with the chimney walls and the space between the lining and the walls should be grouted with cement mortar. The entire flue area should be lined from top to bottom. An accumulation of soot at the base of the flue may cause a hot blaze. If the flue has offsets for fireplaces, etc., they will often be the hottest portion of the smoke passage and the lining should follow the slope and not stop at the end of the vertical part.

Chimneys should be free to move independently of the building. This is always possible for an interior chimney and to a limited extent for one on an outside wall. Joists, etc., should not rest on chimney walls and nails should not be driven into mortar joints. Woodwork



clinched. The short 1x4 braces are then nailed across the corners on each side. All joints should be carefully fitted so as to develop their full strength. Iron cut nails are more durable in exposed positions than are drawn wire nails, but they are brittle and do not clinch so well.

'In setting up a scaffold these rings are stood up at about eight foot centers; 1x6 cross bracing is run from buck to buck to stiffen the frame; the running boards are placed on top in the usual manner.

The Strength and Stiffness of Floors and Ceilings

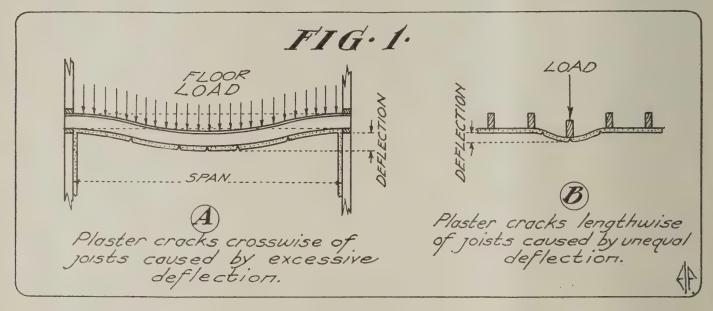
How to Find the Size, Spacing and Safe Span of Timber Joists

By Ernest Irving Freese

IT is a well-known fact, proved by observation as well as by theory, that a beam of any material will deflect, or "sag" when under load. In some cases this deflection will be so slight as to be almost immeasureable, while in other cases it may be so pronounced as to appear dangerous. In any case, however,

this sliding could not take place. Consequently, the upper fibres would then crush and become shortened, while, at the same time, the lower fibres would become correspondingly lengthened.

It is thus seen that there are two main destructive forces at work in all beams subject to bending; one, a stretchstrength, will withstand enormous deflection long before its ultimate strength is reached. A single 2-in. by 12-in. plank, laid flatwise across a clear span of 16 feet, will support a 200-pound man at its center without stressing the timber to more than one quarter of its ultimate strength. Yet the vertical deflection of



this deflection is always present, for the downward force of the load (even though this load be nothing more than the weight of the beam itself) causes the lower fibres of the beam to stretch. Hence the length of the beam, measured along its lower face, becomes greater than the horizontal distance between the two supports, or, in other words, the beam bends downward into a curve that conforms approximately to an arc of a circle. Moreover, since the lower fibres become lengthened, the upper fibres become shortened by an exactly equal amount. This fact can readily be demonstrated by applying a load to a beam composed of two loose planks laid flatwise, one on top of the other. When this beam bends, the upper plank will slide or "creep" upon the lower one so that the ends of the top plank will project beyond the ends of the bottom plank. Therefore, it becomes plainly evident that, if the two planks were fastened together so as to act as one beam,

ing force acting in the lower part of the beam and striving to pull the fibres apart and, the other, a pushing force acting in the upper part of the beam and striving to crush the fibres together. These two forces are termed, respectively, tension and compression. They are equal in magnitude, and opposite in direction. When either one or the other becomes so great as to equal the ultimate strength of the material the beam fails, irrespective of the amount of deflection. Hence, deflection is not a measure of the strength of a beam, but rather a measure of its stiffness or elasticity.

Beams constructed of brittle materials—such as cast iron or stone, etc.—are comparatively weak in tension and possess very little elasticity. They fail suddenly, and will withstand only slight bending before breakage.

On the other hand, a timber beam, being of a tougher and more elastic material, as well as possessing high tensile this plank will amount to 4 or 5 inches! The example brings forcibly to mind the fact that mere strength is not always the governing factor in the design of timber beams.

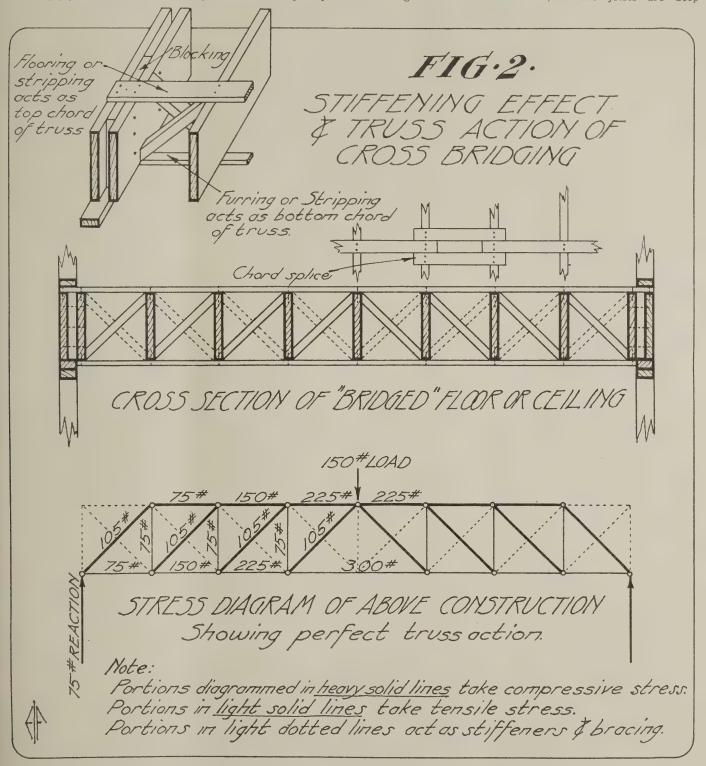
Lack of Stiffness in Joists Cracks Plas-

Fig. 1 illustrates, in an exaggerated manner, two common cases of cracked plastering caused by a lack of stiffness in the supporting joists. In both of these cases, the strength of the joist is ample to safely support the imposed load, yet the resulting deflection is so great as to cause the plastering to become cracked. At "A," the cracks extend crosswise of the joists and are caused by the excessive deflection of the joists under the imposed "live load" of the floor above. At "B," the cracks parallel the direction of the joists and are caused by a suddenly applied concentrated live load, or by a uniformly distributed load, on one or two joists

only. And when the "suddenly applied concentrated live load" takes the form and substance of a 200-pound plumber who, with enviable acrobatic ability but small judgment, essays a trip across the tops of the ceiling joists in search of a leaking pipe or a hole in the roof, his

deeper joists—to provide against the chance visits of perambulating and acrobatic plumbers or electricians; yet, from the view-point of the owner, the slight additional expense of deeper joists and efficient cross-bridging will more than offset any expense that might other-

to distribute any chance load that may come upon one or more joists, but its greatest value is in holding the joists against buckling. The strips should be securely nailed to each joist with three 10-penny nails, before the ceiling is plastered. And, if the joists are deep



progress can be noted from below by the undulating wave of cracking plaster that attends his footsteps. It is probably beyond the bounds of reason to suggest to the builder to make the topstory ceiling stiff enough—by using wise be incurred by the repair of a damaged ceiling. In any case, however, the tops of the joists should be tied together by 1x6-inch stripping crosswise of the joists and about 4 feet apart.

This stripping helps, in a measure,

enough to be cross-bridged, a row of stripping should occur directly over the bridging.

Advantages of Cross-Bridging

In Fig. 2 is illustrated the stiffening effect and truss action of well-con-

structed cross-bridging. The point to be especially borne in mind is that the bridging, to be of any value at all, must be supplied with a top and bottom chord, thus transforming it into a perfect truss that will be capable of carrying loads of itself, as well as capable of resisting deflection. If the joists are to support a floor and ceiling, then the necessary top chord will be supplied by the flooring at right angles to the joists, and the bottom chord by the cross furring that carries the lathing, as is indicated in the detail sketch of Fig. 2. In the event that the joists are to carry only a floor, or only a ceiling, the lack of a bottom or top chord, as the case may be, should be supplied by 1x6-inch strips securely nailed or lag-screwed to the lower or upper edges of the joists. And, in all cases, the chords should be in one continuous length, or spliced as shown in Fig. 2. The stress diagram in Fig. 2 shows that cross-bridging, carefully done in the manner suggested, will transmit loads crosswise of the joists, and independent of same, to the side walls of the building. In other words, the floor could be sawed in two, crosswise of the joists, on both sides of this bridging, and yet the bridging would still stand of itself and be capable of carrying loads.

Bridging Valueless Without Truss-Chords

Bridging, as ordinarily put in, that is to say, without supplying same with efficient truss-chords, is valueless and a pure waste of time and lumber. In fact, unless constructed in the manner suggested, it might as well be omitted entirely. This statement requires an explanation, for it explodes, with a "bang," the theory that ordinary cross-bridging holds the joists against buckling and also "distributes the load from an overloaded joist to others not similarly loaded." Now, in the first place, a joist will not buckle on the tension side because the stress there is a direct "pull," and no amount of pull will buckle anything, not even a slip of paper; it takes push to do it. But this push, or compression, acts only in the upper part of the floor joist and, since the joists are there held securely by the flooring, the bridging becomes useless in this respect. In the second place, cross bridging in which there can be no truss action because of the lack of a bottom chord to take the tension, does not "distribute" the load nor relieve the floor of concentrated loads. On the contrary, the bridging here can act only as bracing, and therefore merely serves to transfer a concentrated load, in total, from one joist to another. Nothing is gained by this transfer, for, if one joist must be overloaded, what difference does it make whether it is this or that joist?

It appears, then, that it is the height of folly and extravagance not to provide this system of bridging with the lacking top or bottom truss-chord since, without it, the bridging is practically useless, while, with it, the bridging becomes a contributing factor toward the strength and stiffness of the floor.

Data Table for Joists

In the accompanying table, complete data is given for the size, spacing and maximum safe span of 2-inch joists for the support of floors and ceilings. In the computations by which the tabulated values were arrived at, due regard was given to both the required strength and stiffness. The table can safely be used for any kind of structural timber, since the calculations for strength are based on a working stress of 1,000 pounds per square inch which gives a factor of safety varying from 4 to 6, depending upon the kind of timber employed and the degree of moisture it contains. A "live load," or a superimposed floor load over and above the weight of the construction, of 40 pounds per square foot has been allowed, which is amply safe for residence and schoolhouse floor. In fact it has been demonstrated that a crowd of densely-packed people will not exceed this load per square foot of floor area, which means that, even in a crowd, the average adult occupies about 31/2 square feet of "standing-room." Hence this unit load is entirely sufficient to include the weight of furniture, desks, office fixtures, etc. It should be remembered, however, that the table is not to be used for beams or girders carrying partition loads or, in fact, for any beams carrying superimposed uniform load that would amount to more than an equivalent load of 40 pounds per square foot of supported floor area. However, by a little simple calculation, the number of 2-inch joists necessary to support a lengthwise partition can be easily determined.

First Example

To illustrate, let us suppose that the size and spacing of joists are to be determined, for the support of a floor only, across a span of 18 feet. In the table, under the heading of "maximum span," follow down the column entitled "for the support of a floor only" until a span is found that comes nearest to 18 feet. Then follow this row across to the left of the table where the required size and spacing of joists will be found under the columns headed "size of joist" and "dist. on ctrs." In this case, two spans are found that nearly correspond with the given span: one, 18 ft. 4 in. and, the other, 18 ft. 1 in. Hence, either 2x10-in. joists, 16-in. on ctrs., or 2x12-in. joists, 24-in. on ctrs. can be used. The latter size and spacing will be adopted, since it results in less lumber. Now, suppose a partition, running lengthwise of the joists, must also be supported by them. First, calculate the dead weight per lineal foot of the partition. Then, calculate the live load per lineal foot that is allowed on each joist. Divide the former by the latter, and add 1 to the result. This will be the number of 2-in. joists required under the partition. We will consider this particular partition to be 8 feet high, and plastered on both sides. Allowing 9 pounds per square foot for the weight of plaster, and 2 pounds per square foot for the weight of the studding, gives 20 pounds per square foot for the dead weight of the partition. Hence, since it is 8 feet high, the dead weight per lineal foot will be 20x8 or 160 pounds. Now, since the floor joists in the table are calculated to carry a live load of 40 pounds per square foot, it is easily found that the allowed live load per lineal foot, for a joist spacing of 24-inch, is 40x2 or 80 pounds. Hence, dividing 160 by 80, and then adding 1, gives 3 as the required number of 2x12-inch joists to carry the partition.

Second Example

As another example, suppose the floor joists in the above problem were to carry a plastered ceiling in addition to a floor. Looking down the tabulated column, headed "for the support of a floor and plastered ceiling," the nearest span to the required span of 18 feet is found to be 18 ft. 1 inch, which calls for 2x12-in. joists, 20-in. on ctrs. This spacing allows a live load of 40 pounds times 1% or, say, 65 pounds per lineal foot of joist. Hence, if the partition in the first example were to be carried upon these joists, it would require 160/65 plus 1, which is 3.46, or, in whole numbers, 4.

Third Example

As a final example, let it be required to find the size and spacing of joists to carry a plastered ceiling, only, on a span of, say, 18 feet. Looking down the column headed "for the support of a plastered ceiling only" it is found that the nearest economical span to 18 feet is 18 ft. 9 in. And this calls for 2x8-in. joists, 20-in. on ctrs.

In the last two examples, the ceiling must be cross-furred, since the 20-in. spacing of the joists does not accommodate itself to the stock length of lath. This cross furring, however, would probably prove more economical than spacing the joists closer together. Moreover, the cross furring is desirable in all cases, whatever be the joist spacing, because of the fact that it supplies a bottom chord to the cross-bridging, as has been heretofore shown in Fig. 2.

TABLE FOR DETERMINING THE SIZE, SPACING, & SPAN OF TIMBER JOISTS FOR THE SUPPORT OF FLOORS & CEILINGS.

					4
Size	Dist.	MAXIMUM SPAN .I.			B=2"
of	077	For the	For the	For the	d
1 1	,	support	support	support of	+S- L
joist	,	of a floor &	of a floor	a plastered	η h
·bxd·	·N.	plastered ceiling	a floor	ceiling only.	Notes:
2"×3"	12"	5'-6"		8!-5"	The tabulated spans can safely be used for any kind of structural
	12"	5'-1"	6'-5" 5'-7"	7-9"	timber, and were computed on the
	20"	4'-7"	5-1"	7'-4"	following data: LOADS
	24"	4'-3"	4'-7"	6'-10"	Wt. of joists @ 3 lbs. per bd. ft.
2"×4"	12"	7'- 4"	8'-7"	11'-3"	Wt. of double floor @ 6 lbs. persq. ft.
	16"	6'-7"	7'-6"	10'-5"	Wt. of plastering @ 9 lbs. per sq. ft, Live load on floors @ 40 lbs. per sq. ft.
	20"	6'-2"	6'-8"	9'-8"	All loads assumed as uniformly
	24"	5-7"	6'-1"	9'-3"	distributed over length of span. STRESSES
2"×6"	12"	11'-0"	12'-8"	16'-6"	Maximum fibre stress@ 1000#/a"
	16"	10'-1"	11'-2"	15-3"	Modulus of elasticity @ 1000000# an
	20"	9-2"	10'-0"	14-4"	<u>DEFLECTION</u>
	24"	8'-5"	9'-2"	13'-7"	Live-load deflection, for floors, limited to 30 "per ft. of span.
2"x8"	12"	14'-7"	16-9"	21-3"	Dead-load deflection, ceiling only,
	16"	13'-6"	14-8"	20-0"	limited to 30" per ft. of span.
	20"	12'-2"	13'-3"	18'-9"	Dead-load deflection, for floors, limited by safe stress on joist.
	24"	11-2"	12'-2"	17-9"	FORMULAS
2"×10"	12"	18-4"	20-9"	26'-0"	Spans enclosed by heavy solid lines are governed by the
	16"	16-8"	18'-4"	24'-4"	live-load deflection, & were
	20"	15-2"	16'-5"	23'-2"	computed as follows:-
	24."	13-10"	15-2"	22'-1"	$L = \frac{6.27d}{\sqrt[3]{11}}$
2"×12"	12"	22'-0"	24-8"	30'-0"	J/W; Spans enclosed by heavy
	16"	20'-1" 18'-1"	21-9"	28'-8" 27'-4"	dotted lines are governed by
	24"	16'-7"	18'-1"	26'-0"	the dead-load deflection, &
2"x]4"	12"	25-7"	28-7"	200	were computed as follows:-
	16"	23-4"	25-4"		$L = \frac{6.27d}{\sqrt[3]{w}}$
	20"	20-9"	22'-8"	Spans not noted above are governed by	
	24"	19'-3"	20'-9"	the max, fibre stress caused by the total live load & dead load acting at the same	
2"×16"	12"	29-4"	32'-5"	time, I were computed as follows:-	
	16"	26'-6"	28'-8"	I ₁ = 14.9d	
	20"	23-9"	25-9"	L=spaninft. VW,+W	
	24"	22'-0"	23'-9"	W = live load	od per lineal ft. of span.
				1	

Employing Electricity to Sell Houses

Providing for complete use of electric household appliances furthers the renting and sale of residence properties

WOULD the sign displayed on this page attract your attention if you were seeking to rent or buy a house? If your household is one among the millions that consider the service of electric appliances vital to home comfort, it would. And in the matter of things which make for human comfort and happiness the safe rule to follow is that what we regard as essential is held in like moment by others. That's true, isn't it? Certainly it is a fact that the residence which offers the most in the way of comfort and convenience appeals most to the fancy of the homeseeker. Well, the day's long since past when even the most primitive-minded took exception to the statement that electrical service in some or all of its available forms lightens the labor in the home and makes living more worth while.

In the May number of the NATIONAL BUILDER, Elizabeth Whipple discussed "Some Electric Conveniences Women Want Contractors to Provide." suggestions given there are in every way most excellent, and the builder who observes them will be promoting business in just that degree that he gives people what they have come to regard as essential. In that article this statement occurs: "Most people make the mistake of putting in too few outlets in the first place. Did you ever see a house built in which the wife did not wish she had more outlets?" As a rule that is indeed true. It makes no difference whether the house has been built to the owner's order, or whether it has been put up for speculation or investment-the day soon comes when the lack of outlets is deplored; and the salability of the house decreases proportionately. The reason is easily explained. The housewife who awakens to the benefits enjoyed through the use of one electric household appliance quickly develops an Oliver-Twist appetite for further such helps. Starting in with an electric washer, say, and an iron, it is not long until the craving for more electric service leads to the purchase of other appliances. Perhaps it is an electric cleaner that is next added to the household equipment, and, then, unless all rooms have been equipped with outlets, the point which Miss Whipple has made is shown to be correct-better facilities for the use of the appliances are demanded. The suggestions given here are designed to assist the owner or contractor in planning the wiring and

the disposition of outlets so as to insure ample facilities for the use of electric appliances and devices in any part of the house where their use is required.

The generally accepted belief is-and the figures all point to its correctnessthat approximately 85 per cent of American housewives now get along without the help of servants. And that fact at-

77 his house is wired for complete electric service—for drio ilmios

tains additional significance when considered in the light of the knowledge that the young unmarried daughter of today is more likely to be found at work in the business world than she is to be helping out with the housework at home. And the result of that condition is that the actual work of housekeeping devolves upon fewer hands than was true during the last generation. Hence, one of the big reasons why more and more housewives are turning to the service of electric household appliances to help them out with their housework. other words, a house with only the amount of electric wiring that was the rule a few years ago is today deemed hopelessly inadequate by the housewife who washes, drys, irons, cleans and cooks electrically.

As an indication of the necessity for wiring houses more completely than heretofore has been the practice, these figures speak volumes; they are for the year 1918.

Electric washing machines.....\$20,000,000 Electric cleaners 14,000,000 Electric heating appliances..... 10,000,000 And of electric lamps one hundred and eighty-six millions were sold. Also over one million irons.

Why it is not the general practice to equip new houses with an adequate number of correctly placed outlets is explainable in only one acceptable manner. The ever-increasing demand for houses that are wired for complete electric service has not been generally recognized by those who design and build houses. The following list classifies the appliances according to the rooms where their use is most likely to occur. Few, if any, households make use of all the appliances, but there are many indeed that make use of a dozen or more. And, as has been suggested, the use of one appliance whets the desire for more such advantages.

What comprises complete electric service, and how should a house be wired

Halls

Flectric Cleaner Table Lamp
Fan Motor Sewing Machine
Electric Talking Machine Turn-Down Lamp
Electric Piano

Parlor or Reception Room

Outlets
Table Lamps
Electric Cleaner
Dining Room
Hot Wat

Fan Motor Electric Piano Flectric Talking Machine

Chafing Dish Coffee Percolator Tea Kettle Lighter Cigar Ligh Fan Motor

Hot Water Heater Radiant Grill Luminous Radiator Electric Cleaner Samovar

Kitchen

Electric Irons
Washing Machine
Electric Stoves
Electric Tea Kettle
Disc Stoves Frying Pans Glue Pot Soldering Iron Radiant Grill

Toaster
Electric Cleaner
Fan Motor
Coffee Grinder
Meat Chopper
Bread Mixer
Egg Beater
Silver Polisher
Knife Grinder

Sitting Room or Library

Table or Desk Lamp Electric Cleaner Fan Motor

Cigar Lighter Sewing Machine Luminous Radiator

Bedroom or Boudoir

Luminous Radiator Electric Cleaner Curling Iron Water Heater Water Hear Bed Pad Fan Motor

Reading Lamp at head of bed Ozonator for Sickness Hair Dryer Massage Vibrator Baby Milk Warmer Turn-Down Lamp

Nursery

Electric Toys Electric Cleaner of extra strength

Fan Motor Electric Talking Machine Baby Milk Warmer

Bath Room

Luminous Radiator Electric Cleaner Shaving Mug Curling Iron

Water Heater Hair Dryer Massage Vibrator Turn-Down Lamp

Girl's Room

Flectric Cleaner Bed Pad Fan Motor

Curling Iron Hair Dryer

Laundry

Electric Washer Trons Fan Motor

Laundry Machine Electric Cleaner

Cellar Work Shop

Grinder Glue Pot Soldering Iron Breast Drill

Small Motor for Operating Tools Portable for Cleaning Heater

Garage

Several Outlets for Portables Luminous Radiator, if not Heater Glue Pot Soldering Iron Fire Pumps

Small Motor for Tools Portable Drill Grinding Machine Charging Batteries Flectric Cleaner Buffing Machine

Stables

Grind Stones Electric Cleaner for Currying Clippers Flectric Milkers Churns

Offices

Electric Cleaner Luminous Ra Cigar Lighter

Hot Water Heater Table or Desk Lamp Fan Motor

in order to provide such facilities? That question is the natural one to expect in response to the explanation that has been advanced, and it merits a complete answer. And there appears no better way of answering that question for the contractor-builder than by referring to the floor plans showing location of desirable outlets as featured in Cushing's Standard Wiring Handbook and here reproduced.

The plans tell their own story. So they are being reproduced herewith in the same general form in which they originally appeared.

Be forehanded. Anticipate later needs now. Use ample Convenience Service

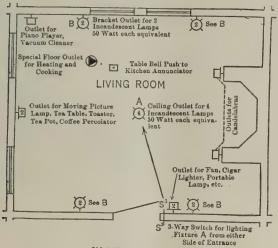
"Convenience" Outlets

For electric service in every room in the home-NOW.

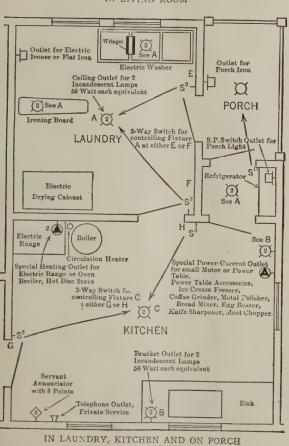
This list shows where Convenience Outlets should be installed, and the appliances that may some day be needed in each room.

A knowledge of the possible electric appliances that are likely to be used by the household whose requirements are considered when designing a house should prove helpful in planning for wiring and outlets.

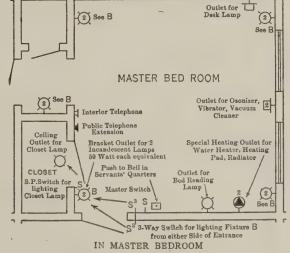
TYPICAL FLOOR PLANS Showing How Additional Convenience Outlets Can Be Located

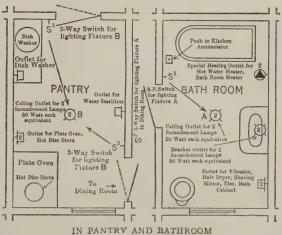


IN LIVING ROOM



To Pantry S 3-Way Switch Outlet for lighting Fixture B in Pantry 2 S 3-Way Switch Outlet for lighting Fixture A (2) B Bracket Outlet for 2 Incandescent Lamps 50 Watt each equivalent See B Special Floor Outlet for Electric Cooking Toaster, Egg Boiler, Chafing Dish, Percolator Table Bell Push to
Kitchen Annuncistor
Ceiling Outlet for 4
Incandescent La.nps
50 Watt each equivalent Outlet for Election Serving Tray,
Drink Mixer 2 DINING ROOM Special Outlet for Heater, Fan, Vacuum Cleaner, etc. \mathfrak{T} Push to Annunciator in Kitchen IN DINING ROOM





This is not a plan of your house or apartment. It is intended only to show where in an average home the minimum number of convenience outlets should be installed. No matter how your kitchen or living room or other rooms are arranged you could and should provide at least as many outlets as are shown on this page

:理:

Working Plans for a 5-Room House

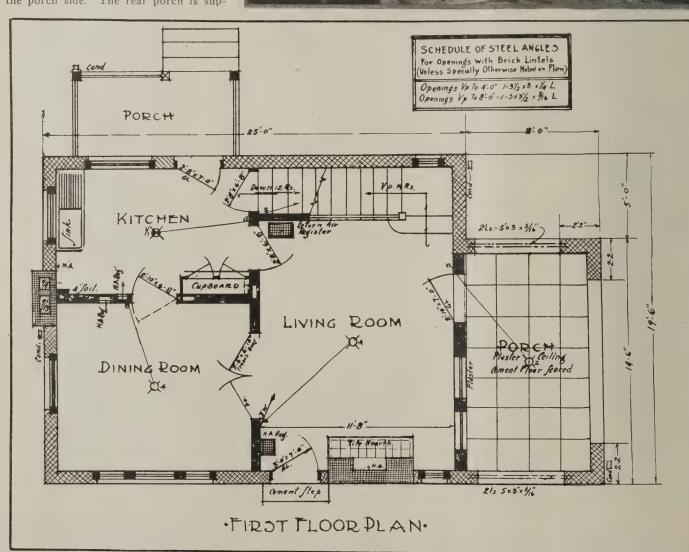
IN THE MAY issue of NATIONAL BUILDER some twenty houses of the Goodyear Rubber Company's development at Akron, Ohio, were illustrated. Four of those were based on the working drawings that are reproduced herewith.

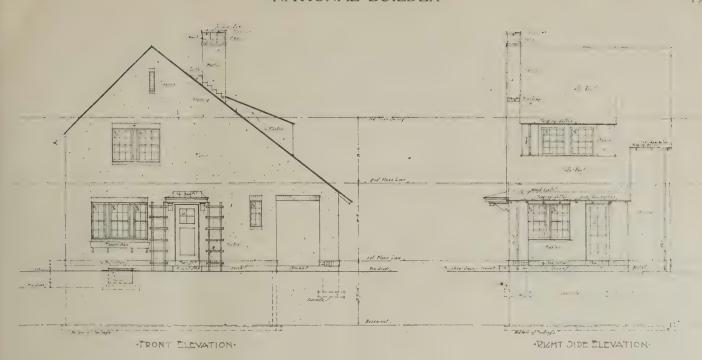
It will be observed that the variation in the appearance of this type of house is obtained by the use of different materials for the exteriors. Brick, wood and stucco were used both singly and in combination, so that monotony was avoided even where two similar houses were placed side by side.

This type of house was built quite frequently and seems to have been one of the most popular of the various types used in this development.

The construction of this house includes hollow tile walls and slate roof. The front porch floor is of concrete. The wall between the front porch and the living room is of frame with stucco on the porch side. The rear porch is sup-



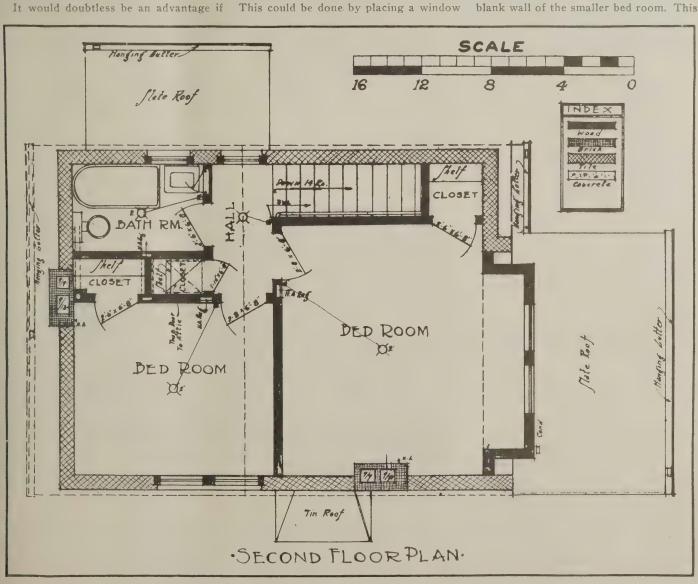


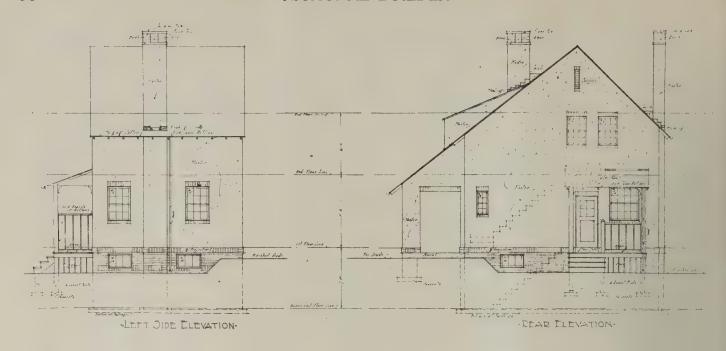


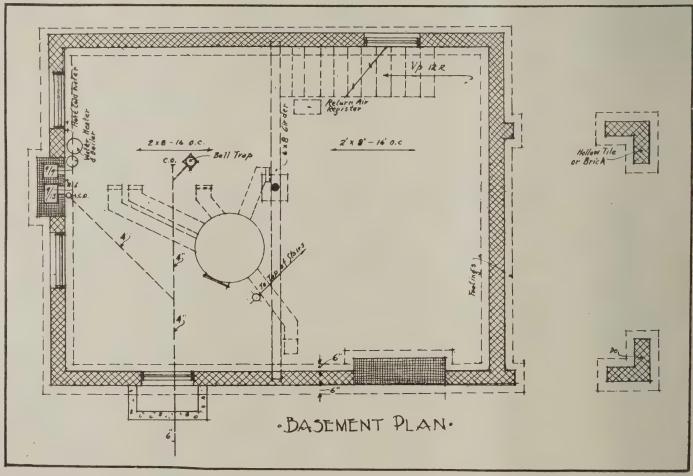
ported on chestnut posts resting on concrete footings.

the windows in the bed rooms were rearranged to provide cross ventilation.

next to the chimney in the front bed room, and by placing another one in the blank wall of the smaller bed room. This







latter window could be a low casement placed close to the eaves or could be in a dormer. The former location would be preferred as it would be cheaper and would look better. The double window in this bed room could be replaced by a single one.

Each room in this house is supplied with a flue so that stove heat may be used thruout if desired.

The drawings reproduced are the working drawings made for this development by Geo. H. Schwan, architect of Pittsburgh, Pennsylvania.

This house is exceptionally well arranged for both compactness and economy. The exterior dimensions are only nineteen by twenty-five feet, yet five good rooms are obtained. Plenty of

closet room is provided and there is quite a bit of space in the attic that may be utilized for storage.

Many families would prefer to have the large side porch glazed so that it could be enjoyed all the year around. This could be done without detracting from the appearance of the house in any degree.

A Story Without Words

THIS may be called a story without words. A sort of moving picture showing the progress of a large job

This development was carried out for the Madison Realty Company by the Capital Construction Company of Madiplans are compact without undue cramping of space and their arrangement is both convenient and economical. The



The Capital Construction Company employs much labor-saving equipment on the job. By so doing they save both time and money—vital elements in the success of any builder

from the start to completion, with a rich sprinkling of working drawings to give practical value to the whole. With such a wealth of photographs and working drawings to choose from it is felt that son, Wisconsin. Mr. C. E. Marks had charge of the work and Mr. P. M. Homer was the architect for the buildings.

These houses were designed for Americans and along American lines. The



These houses are unusually well constructed. "Quilt" or felt insulation was used on all of these buildings. These are the things upon which the satisfaction of a purchase is based. A skimped job is a poor advertisement for a builder

builders will derive more benefit from studying them than from reading a more or less tedious description which would shut out many illustrations for lack of space. workmanship and materials that entered into the construction of the houses was of the highest quality. The architect is to be complimented for the very successful handling of a difficult problem. The exterior designs are a praiseworthy handling of the Colonial style with just enough variation to avoid monotony.

The carrying out of this development involved the transformation of bare land into a modern community. Sewers, water and gas were put in; streets graded, sidewalks laid and everything done to make the scheme a success. Included in the development are eighteen five and six room dwellings; a four room bungalow, and a semi-detached house. The selling prices on these homes run from \$4,175 to \$4,850, depending on the size of the house and its location. A novel feature of the selling plan is the agreement of the company to protect the family of the purchaser by giving a deed, clear and free of all encumberance, to the wife in case of the death of the husband during the first two years of the contract.

The site itself is an exceptionally beautiful one, on a hillside overlooking Lake Monona. A laudable feature of the development is the completeness in which it has been carried out. The lawns were completely planted and kept mowed and shrubs and plants are in blossom. Even the flower boxes were planted. A number of large elms were saved and add considerably to the finished and homelike appearance of the plot. The houses are now nearing completion and the painters are putting the final touches on the job

Houses that are built for sale are often visited by prospective buyers while the job is under way. The ground around such projects should be kept as free as practicable from





Two views made during construction. Note the neat, trim appearance of the buildings even in their uncompleted state

debris and so forth. This not only makes a more favorable impression on the visitor, but reduces the fire hazard and the danger of accidents to the workmen.



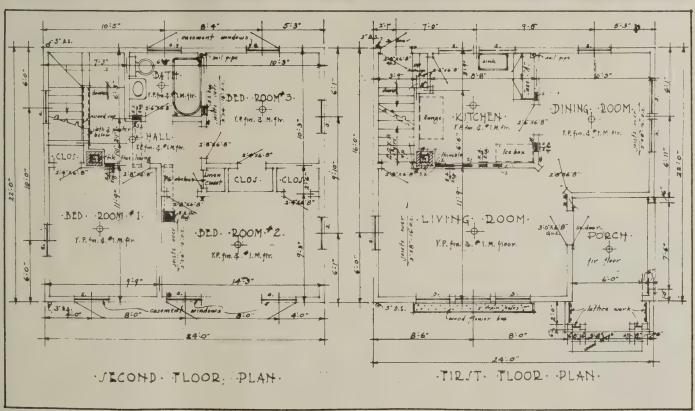
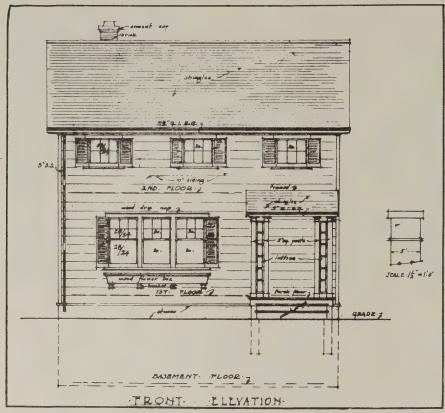


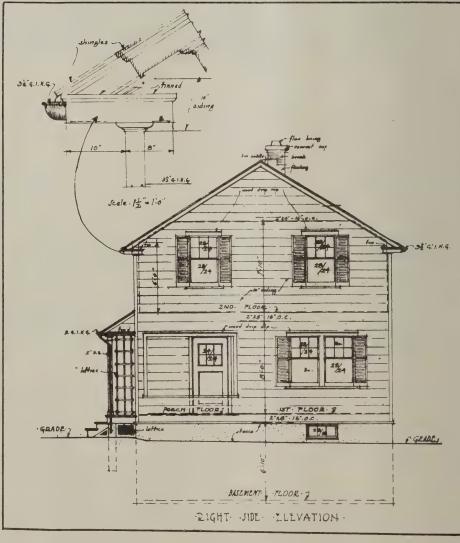
Plate 1

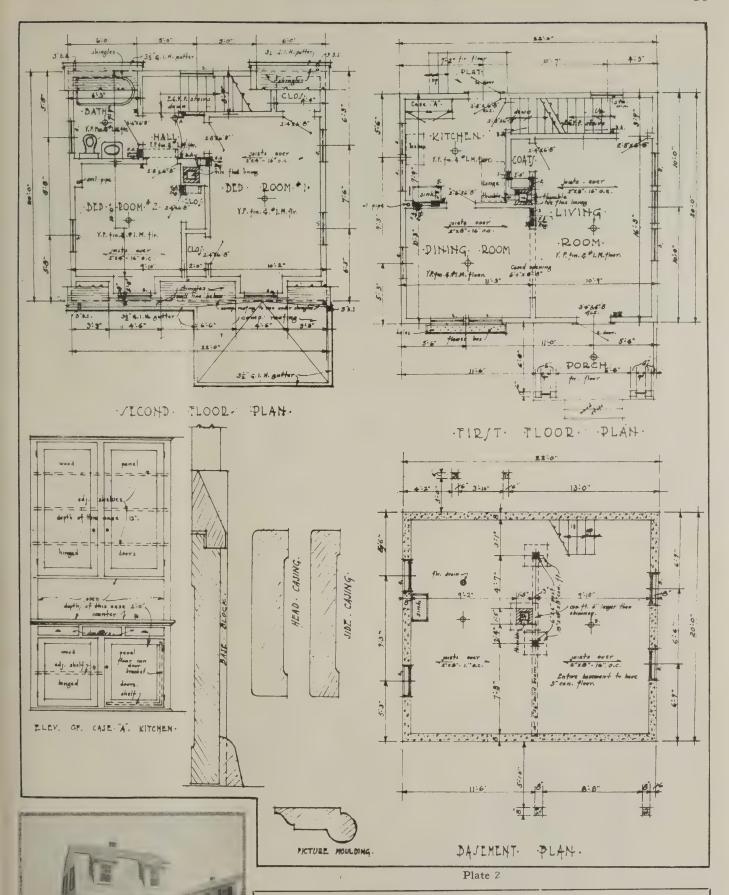
The two types shown in the photograph are based on the same plan. The only difference is in the treatment of the porch entrances. All bed rooms have cross ventilation and ample closets. These are perhaps the most attractive houses in the group.











The single dormers are a pleasing variation from the single wide dormer which usually is seen in Dutch Colonial work. The coat closet in the living room is useful. Note the size of the living room and the main bed room

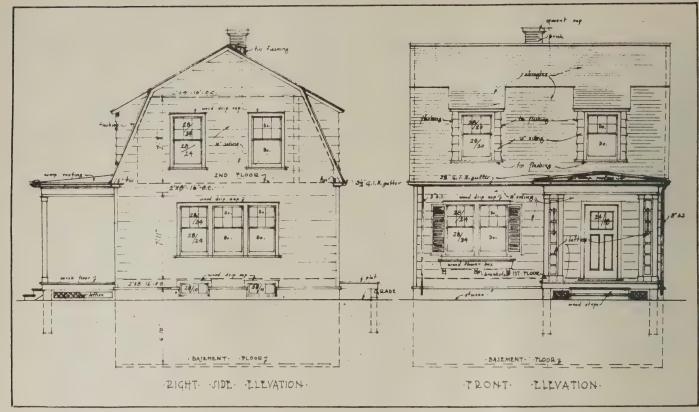


Plate 2

Flower boxes and shutters are responsible for much of the charm of these houses. It is desirable to avoid opening doors over hot air registers when it is practicable to have them otherwise

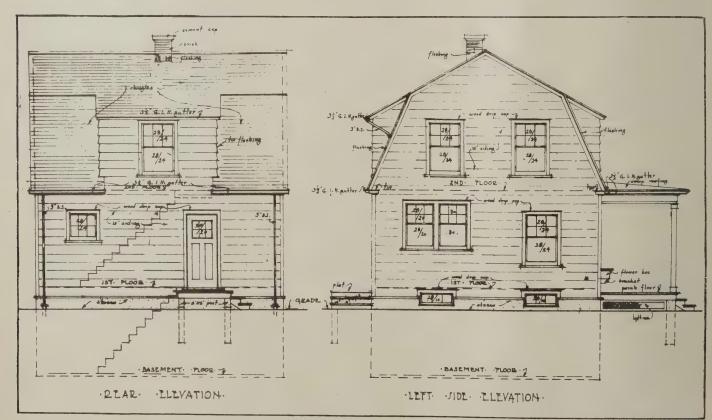


Plate 2



Plate 3

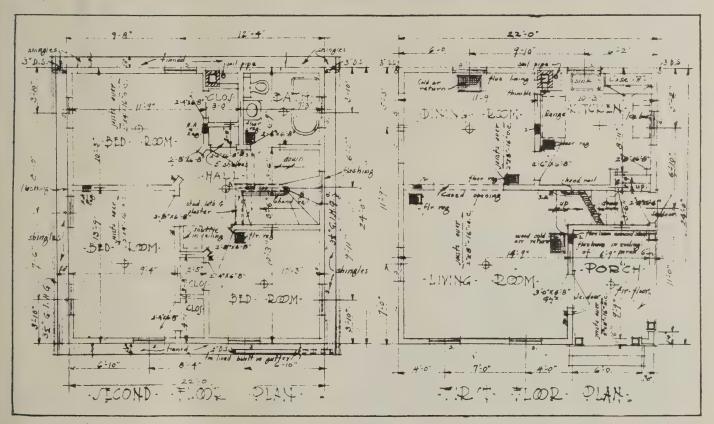


Plate 3



Plate 4

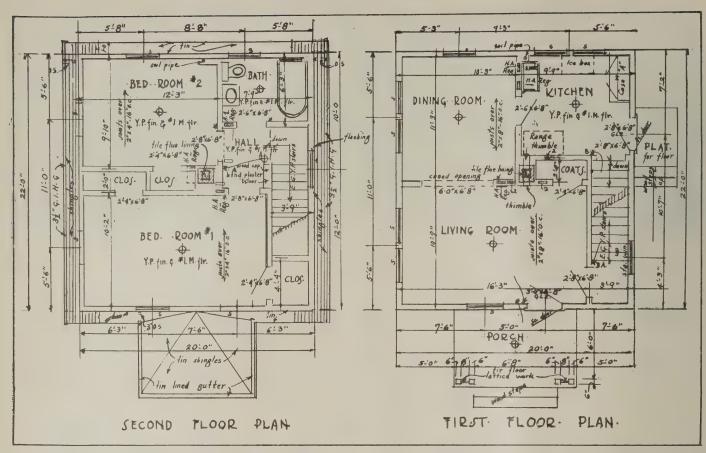


Plate 4



Plate 5

The bungalow is one of the attractive features of the development. It is of stucco, built along the simplest lines with well handled details. The dining nook is well placed. It is convenient to the kitchen and forms an interesting feature of the living room. The small porch at the side might be glazed for all the year use

By using different materials in carrying out the same design, variety is given the appearance of the house.

Note the large size of the front bed room on the second floor. This feature is attractive to many people.



Plate 5

Insulated and stripped, ready for the lath and stucco to be applied

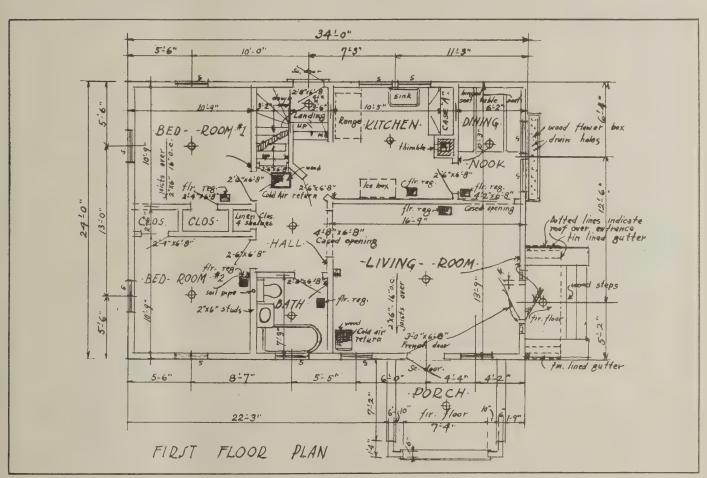


Plate 5

Note the simple character of this plan. Plans that are full of jogs and breaks are seldom satisfactory. They are too "clever" to be practical

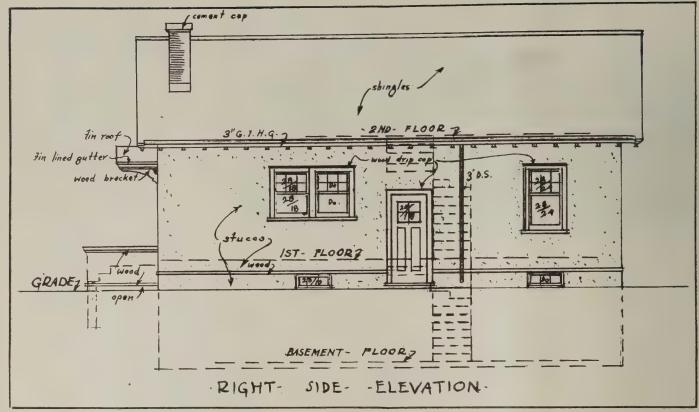


Plate 5

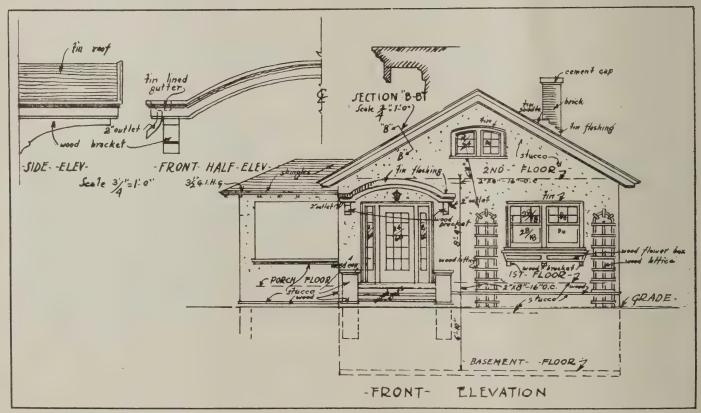


Plate 5

This house is effective because of its freedom from frills.

There is just enough detailing to prevent a barren feeling.





Plate 6

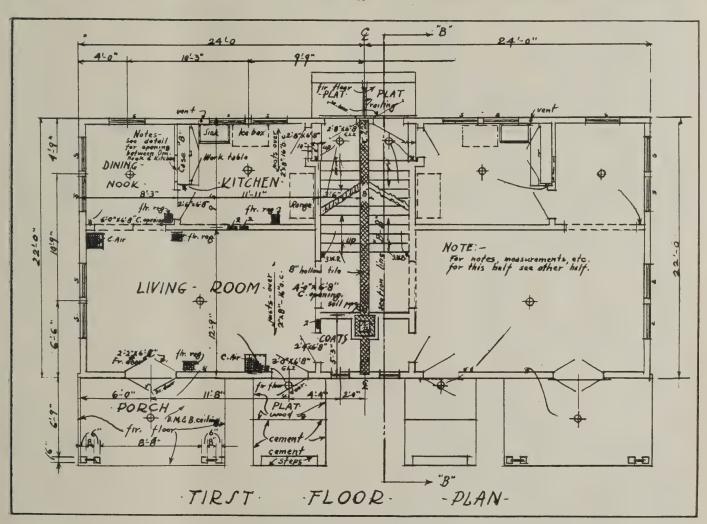


Plate 6

Semi-detached houses are not so common as they were a few years back. Note the sliding back in the case between the dining nook and kitchen. The tile wall between the two houses acts as a sound deadener and fire stop

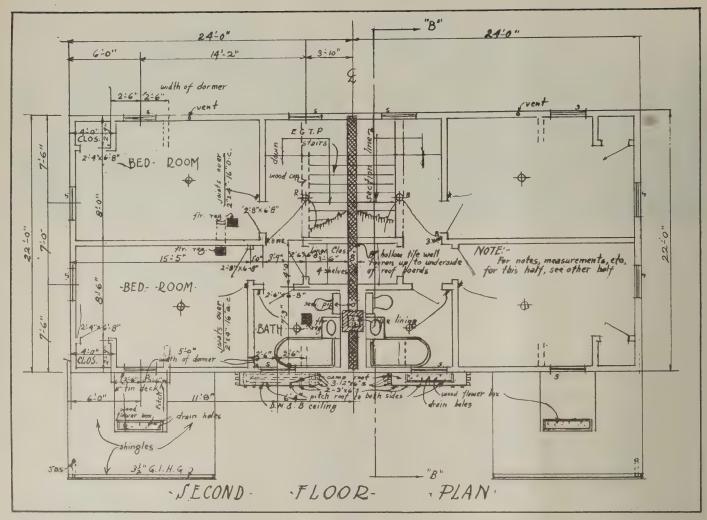


Plate 6

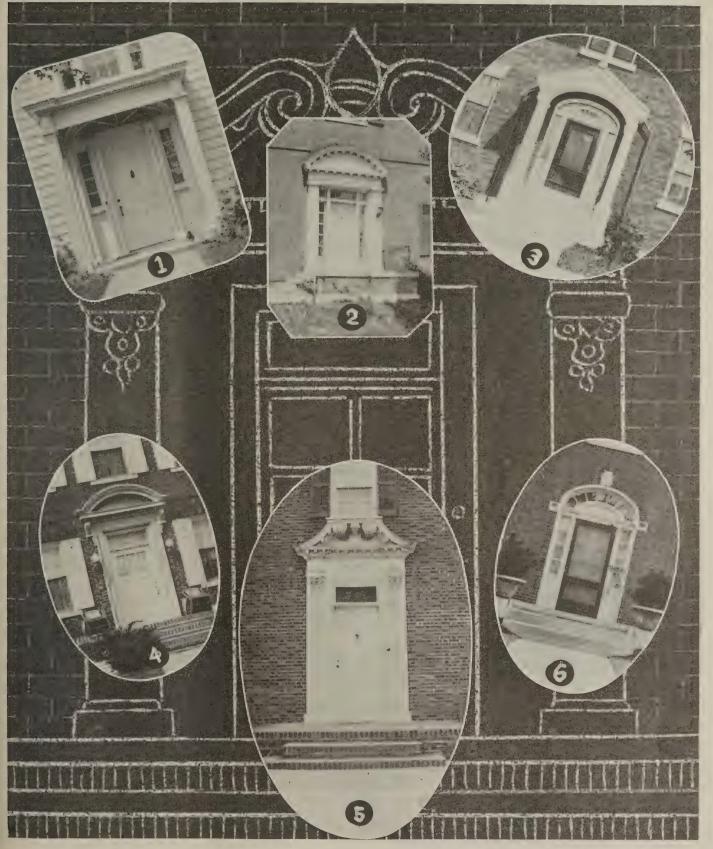


Plate 6

These bed rooms are larger than those usually found in 4-room houses. The cut-in dormers in the porch roofs prevent the chopped-up effect that often results from using ordinary dormers.

The way to benefit from plans is to study them carefully. A hasty examination will not often reveal the many worth while points that are combined to form a good design.

ENTRANCES



1—An entrance in the Colonial style with porch of more modern feeling. The effect is broad and inviting. 2—An excellently proportioned entrance with a somewhat Classic feeling. The iron balustrade is simple and does not detract from the composition. 3—Here we have an entrance along the lines of Fig. 1, but the porch, or frame, is somewhat too "architectural" to be as pleasing as the first one. 4—A severely plain, but very appropriately detailed stone entrance in the Classic style. The proportions are good and the curved pediment adds just the right touch of interest to the composition.

5—A quite elaborate piece of woodwork. This one is also Colonial, based on the so-called "pineapple design" of the early American builders. It is a graceful design and well executed. 6—A simple Colonial doorway. The elliptical arch and the sidelights give it its character. Note how much more simple and effective than the one in Fig. 3



ONE of the most striking features of this house is the built-in garage. This idea is becoming more and more popular, and although the objections have been offered that such a location increases the fire hazard and that it is difficult to prevent the odor of gas from penetrating the living portion of the house, many people are inclined to over-



Rear Elevation

look these criticisms because of the increased convenience and the comparative economy of such a location.

The exterior of this house is of the bungalow type which is characterized by the wide front porch and the lift dormer. The construction is of stucco on wood frame, finished on the exterior with pebble dash walls and stained wood trim around doors and windows. The rear porch is of wooden construction, finished with stained, matched and beaded ceiling and lattice. All roofs are of red asphalt

shingles with square moulded, galvanized iron gutter. The small, hanging bay window shown on the photograph of the front and side elevation would look better if it were carried down to the ground. It has a somewhat detached or temporary look.

The interior view shows the end of the living room which contains the nook. The mantel is built of brown and red bricks with rug texture. It is flanked by bookcases which are of white oak as is all of the trim on this floor. The floors are also of white oak. The finish is golden oak with flat varnish.

The second floor has southern pine floors, red gum trim, and brick doors stained and finished a light walnut. The bath room is finished in white enamel, with Keene's cement wainscot.

The first floor contains, in addition to the customary rooms, a sewing room, a breakfast room and the garage. The sewing room is a very convenient addition and contains a large closet. It should be noted that the telephone closet is accessible from this room as well as from the hall, thus making it possible to use the telephone from the sewing room, privately. The breakfast room partitions are carried to the ceiling thus giving this feature more privacy than is obtained in the customary breakfast alcove. The stair is built between walls, thus simplifying the construction with a resulting saving in cost. The

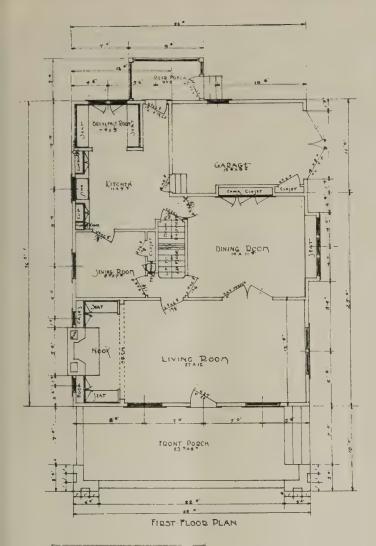
kitchen is well equipped with built-in features. The dining room contains a built-in china closet which extends into the wall thus saving floor space. The bay window in this room forms a space for a window seat. The living room is generous in size with the nook at one end.

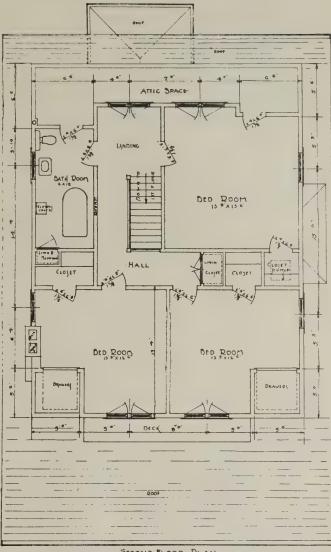
The second floor contains a rather large hall into which all of the rooms of this floor open. The bath room is also large and contains in addition to the three fixtures, a combination linen and medicine closet. The clothes chute runs



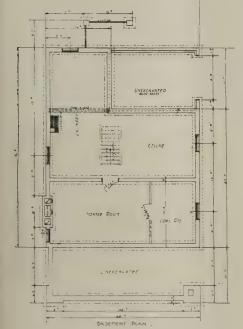
Living Room

from this room, through the kitchen and into the clothes bin in the basement. The attic space under the roof makes a convenient storage place. The two front bed rooms each have closets, and in addition drawers have been placed in the roof spaces at the sides of the front





SECOND FLOOR PLAN



dormer. These drawers are much more practical than are the back-breaking closets that are usually placed in these spaces.

The basement is fully excavated except for the portion under the garage

and under the front porch. The foundation walls are of vitrified hollow tile and the floors of cement. A tile wall also is used to separate the heater room from the rest of the basement, this reduces the fire hazard somewhat. The basement contains the hot air heating plant and three cement laundry tubs.

SCRATCHED JOINTS VERSUS SMOOTH JOINTS IN GLUING

The common assertion that scratched surfaces make stronger glued joints than smooth surfaces seems hard to prove. Comparative tests made on several occasions by the Forest Products Laboratory, Madison, Wisconsin, all indicate that the strengths of these two types of joints are practically the same.

The test specimens used by the laboratory were pairs of hard maple blocks, some with smooth and some with toothplaned contact surfaces. These blocks were glued with a high grade hide glue, allowed to stand for a week, and then sheared apart in an Olsen universal testing machine. Four joints of each type were compared in a single test.

Eleven such tests gave the following average results:

Comparative Strength of Scratched and Smooth Joints

Scratched Joints Smooth Joints Wood Wood Wood surface Shear surface Shear Test Strength Strength failure failure lbs. 1bs. per per No. sq. in. cent sq. in. cent 1855 1787 25 943 1366 50 3086 1976 1571 25 2409 100 100 2298 2416 1678 1947 75 62 2310 1800 100 1835 100 2455 25 62 75 1425 2180 2330 2180 2520 35 2040 Gen. Avg. 1988

It will be noted that in seven of the eleven tests smooth surfaces gave the better adhesion. Consequently it would seem that there is no advantage in tooth-planing wood for gluing purposes.

Uncle Sam's Advice on Building on the Farms

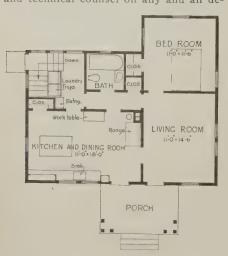
By Waldon Fawcett

JUDGING from the letters that have lately come to Washington, the everyday builders of the country are just awakening to the fact that Uncle Sam has launched a free "information bureau" covering building construction. It is, however, no shame to the builders

tails of building construction on the farms. The fact of the matter is that whereas this unique Federal enterprise was entered upon some three or four years ago it is only just now "finding itself" and taking form worthy of its importance.



that they are just discovering, most of them, that the Government stands ready to give, for the asking, expert advice and technical counsel on any and all de-

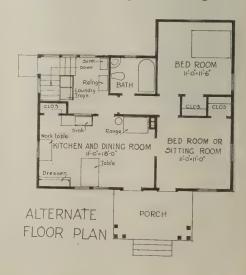


That this new form of first aid for the building industry is even now as conspicuously in the limelight as it is may be attributed to a vagrant item that went the rounds of the newspaper press a few weeks ago. This was in the form of a something-for-nothing hint to the effect that if any citizen or contractor was contemplating the erection of a house all he had to do was to write to Washington, telling of his wants, and the paternal government would prepare specially for him and in accordance with his specifications, a full set of working plans. The public is yet responding to that unauthorized invitation and the officials are kept busy explaining that the only plans available for distribution are stock plans and not new, made-to-order designs.

Builders stand to derive so much practical benefit from Uncle Sam's gratuitous advisory service that it is well

they grasped, from the outset, its exact scope. The Government's helping hand is not extended to building in every field of operations. Instead, the whole project is intended to bring about the erection of more and better buildings on the farms. The bureau through which this is brought about is, therefore, a branch of the U.S. Department of Agricultureto be specific, a division in the office of rural engineering. A goodly proportion of the requests thus far made of this clearing house for building information have come direct from farmers, but that does not mean that the officials are not quite as ready to devote time and labor to answer the queries of builders. Indeed, it seems likely that builders, if they choose to improve their opportunities, stand to gain far more benefit from the new service than will the chance farmer who essays his own building.

In an effort to give the busy builder a bird's-eye view of just what the Government has set out to do in this quarter and what it offers the construction man on the job, it may be recited that the Government program goes to the very bottom of the whole responsibility of farm building construction and works through the field, step by step. Thus, there has been an investigation of farm domestic water supply and drainage disposal and, by way of preface to building plans, there have been evolved plans for sewage-disposal and water-supply systems. Proceeding to the sphere of farm buildings we find this novel architectural and rural engineering bureau concerning itself not merely with farm houses but with the entire range of buildings re-





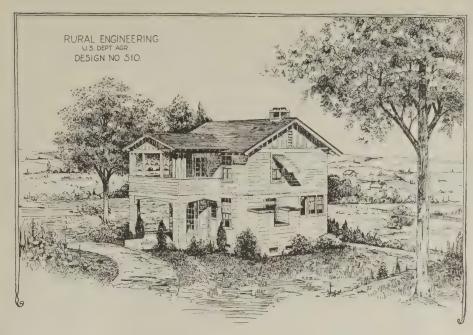
FIRST FLOOR PLAN



SECOND FLOOR PLAN

quired on the modern farm, including barns, silos, cribs, farm shops, granaries, etc. Naturally, however, the farm dwelling is the subject of most intensive cultivation, as it is the one that comes closest to the interests of the professional builder.

For builders, the rapidly developing operations of the Bureau of Rural Engi-



States, an era of power farming, with tractors, private electric plants, power washers, etc., etc., all of which costly equipment requires more adequate shelter than was necessary before the mechanical equipment came into vogue.

It is patent that a builder whose operations have been confined to town and city sites may have a good many questions to put to the experts when he

Whereas the specialists at Rural Engineering headquarters stand ready to make a try at answering any allowable question from a builder-and there have been instances where days of research have been devoted to the response to a single riddle—they are obliged to adhere strictly to a policy which prevents them from recommending the product of a given manufacturer. To illustrate the limitations that obtain, it may be cited that not long since a builder sent to Washington for examination a sample of single-ply roofing which he proposed to use on a job under way provided the department gave a favorable verdict on it. The officials could not, under the ethics that govern their operations, tell that builder that the roofing submitted would be likely to wear any approximate length of time nor could they compare it in quality with other brands of similar material on the market. What they did do, however, was to counsel the builder

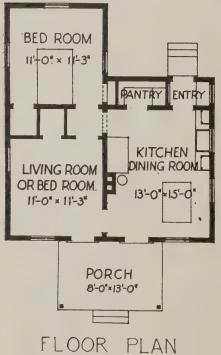


neering at Washington really divide themselves into two classes. One comprises the free distribution of plans or blue prints. The other consists in the answering of the technical questions propounded. It is a marvel how handy the everyday builder will find this oracle, once he gets the knack of referring to it his knotty problems. This advisory service is made available, too, just in the nick of time, because the "Build Now" movement is more noticeable on the farms than in any other environment. It is not merely that the prosperity of the past few years has left the farmers with money in pocket with which to build. On top of that is the consideration that we are entering, in the United

enters the field of farm construction. No less valuable, however, will be the counsel which the specialists at Washington may be enabled to offer to the veteran builder who has had plenty of experience with farmhouse contracts. such an extent is every farm construction proposition a law unto itself, such is the likelihood that unusual conditions will be encountered in each individual case, that there is little opportunity to follow the rules of thumb of city building and welcome indeed may be the hints that can be dropped by architects and rural engineers who have made a study of farm home building with due regard to geographical location, climatic conditions and all the other influences.







that for the purpose to which he proposed to put the material a heavier grade of roofing would be preferable. That is a fair illustration of how the office will go just as far as it can in giving what might be accounted general advice, but will not assume the responsibility of endorsing or condemning a specific product.

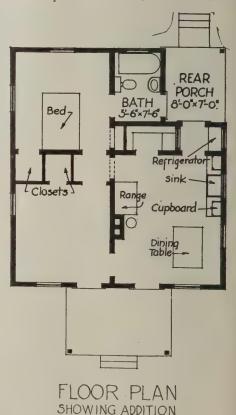
Up to date, this advisory service has been confined to the answering through personal correspondence of the individual inquiries of builders and other interested persons. Incident to the research work thus made necessary, however, there have been built up valuable data files and it is planned to ultimately make the meat of this information available to builders at large by means of bulletins or other printed forms. Probably the heating systems adapted to farm homes will be the first subject taken up and will be succeeded by others of like import.

The plans service covering farm homes and buildings, as conducted by the Rural Engineering Office, is essentially an advisory or information service, but it is not an individual service in the same degree as the "answers to correspondents" service above outlined. There have been isolated instances where the institution at Washington has prepared original plans in answer to the request of an individual—especially if his request opened the way for constructive work that promised to be broadly beneficialbut generally speaking, the plan service is confined to the distribution of stock designs which are, in a sense, standardized in that each design has been evolved to meet a demand common to farm communities.

The slogan, "A purchase to fit every purse," might be applied to the house planning activities of this farm service bureau. Upward of a score of farm house plans are now available for distribution and these are intended to represent varying costs; to supply accommodations of considerable range, and to make available styles that will fit the several geographical conditions of the country. An important novelty is sched-

uled for the summer or early autumn of 1919, when there will become available a series of four plans for what might be termed a progressive or cumulative farm house. These interlocking plans will meet the strong demand from farm folks for a scheme whereby an agriculturist may start with a modest dwelling and may, as his family increases or his prosperity grows more marked, gradually add to the original structure. It has always been possible, to be sure, to tack on a room here or there to the average farm house, but it is the fashion in which such additions have been made that has been responsible for the rambling structures that, if not actually an evesore, are at least difficult to heat. The scientifically-balanced building scheme which the Federal experts have just perfected will permit a farm house to expand to several times its original dimensions and yet will insure a compact arrangement and pleasing architectural appearance at every step in the progres-

Another quarter in which this architectural plan service is calculated to help builders at this juncture is that which involves the housing of workers on the farm. The labor problem, it is needless to comment, is more acute in the farming industry than in any other field of endeavor and it is conceded on all sides that something must be done and done quickly to render agricultural employment more attractive to wage earners, married and unmarried. The consensus of opinion seems to be that one of the most important means to this end is to





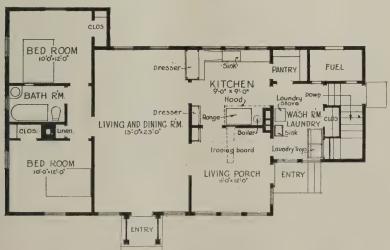
tion that has been available has been a typewritten list and it has been found rooms. The first catalogue to be issued will, it is expected, be devoted to farm houses.

While the chance homeseeker, when

be found in the provision of comfortable living conditions and pleasant surroundings that will be conducive to contentment on the part of the toilers and their dependents. In encouragement of this objective the architectural annex of the Agricultural Department has prepared plans for a number of bunk houses and tenant houses arranged to meet the precise needs of farm workers-especially the workers who have come to the farms from the cities and demand a reasonable proportion of city conveniences.

Blue prints, if sent broadcast, would prove expensive in the aggregate and consequently the Rural Engineering Bureau has to demur to the request of the country man who writes: "I am thinking of contracting for a farm house; please send me all the plans you have.' It is to enable the giving of assistance to the casual inquirer at something less than prohibitive expense that the department is now hatching a scheme whereby there will be issued descriptive





plans of all the architectural designs in stock. To date, the only guide to selec-

catalogues carrying elevations and floor that few inquirers can intelligently choose a design from a short synopsis of dimensions and the enumeration of

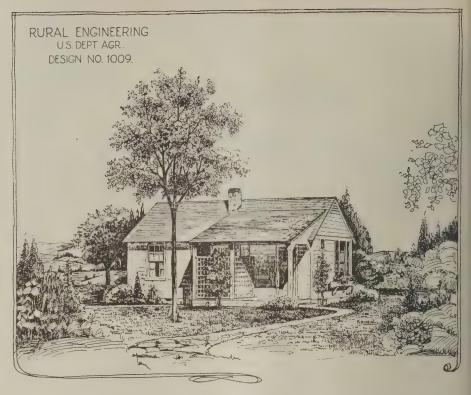
he calls on Uncle Sam for his whole bag of architectural tricks, is apt to be asked to narrow down his request to definite requirements, this does not imply that the same policy is pursued with reference to a builder who may have occasion, sooner or later, to erect a number of farm dwellings from the Government's approved plans. Upon a showing of proper justification a contractor may obtain a reasonable lay-out of blue prints covering the popular designs. In passing, the hint may be dropped that contractors who have a chance to land farm contracts might profitably take a leaf from the book of the energetic lumber dealers. From all parts of the country wide-awake lumber dealers have been beseeching the department for complete sets of farm house blue prints. Each plan carries a bill of materials and with such a prospectus in hand it is not only

possible to interest a farmer prospect in the plan which best strikes his fancy, but to give him a close estimate on the cost of material and expense of construction.

The canny builder will not overlook the moral effect of being enabled to offer



to a rural prospect a design for a residence that has the formal approval and endorsement of the national government. Aside, however, from this sentimental equation, there is a genuine asset in the specialization which supplies plans that take into account the exceptional customs and conditions which obtain in the country districts and which might be missed entirely by the architect whose practice was confined to the city. For example, farm conditions require no concessions such as must be made to the narrow city lot. The farm house may be set broadside to the road if that be pref-



erable. Again, there is the circumstance that in many of the more modest farm houses the expedient of the combined living and dining room or combined kitchen and dining room is resorted to to an extent not followed in the cities. Such traditions of farm housekeeping are carefully taken into account in the cal-

culations of the Rural Engineering Bureau. For all, however, that so creditable a beginning has been made, Mr. M. C. Betts, who is in general charge of the work, contends that he and his staff have only scratched the surface of the possibilities of service in behalf of specialized farm building.

A Park Pavilion



The photographs illustrate a pavilion for an amusement park at Toledo, Ohio. This building is to be used as a waiting room and has refreshment booths, etc., for the convenience of the public. It

would be equally appropriate for use as a dance hall or for any other similar public function.

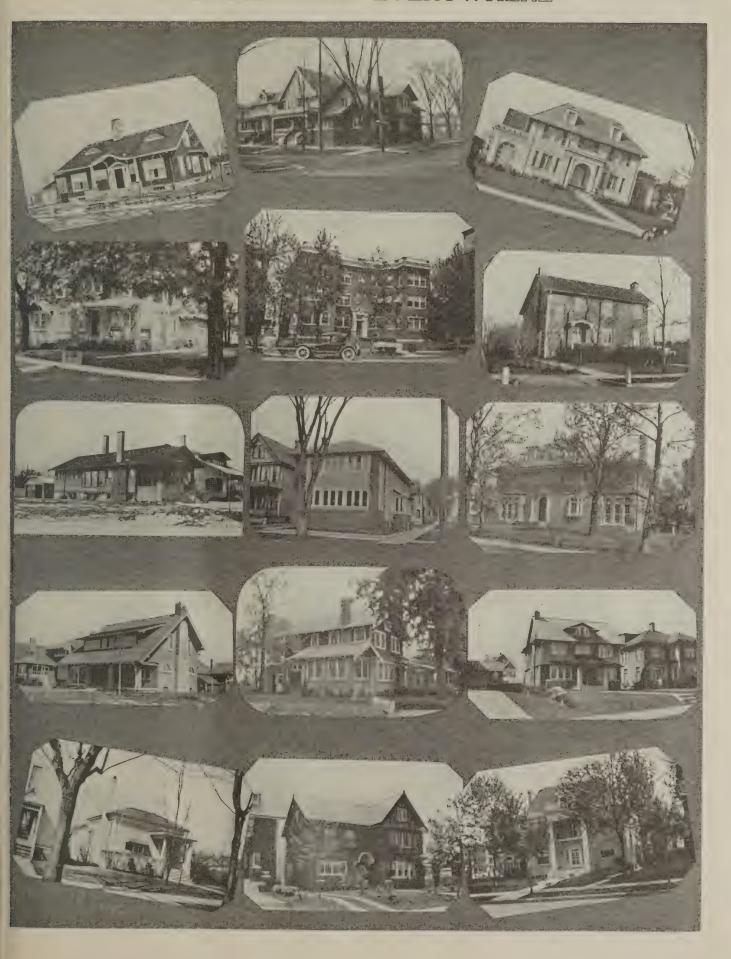
Wood construction is used throughout and the interior is finished with wall



board, which is well adapted for a building of this type.

Matched ceiling lumber has been used to good effect for giving a different air to this building.

HOUSES FROM EVERYWHERE



HOUSES FROM EVERYWHERE



Publications Received

An Extension of the Dewey Decimal System of Classification Applied to the Engineering Industries—By L. P. Breckenridge and G. A. Goodenough. Bulletin No. 9, revised edition, University of Illinois. 118 pages; paper covers. Price 50 cents.

Garage Hardware for Rolling Doors— Instructions for Installing, The Stanley Works, New Britain, Conn.

Blue Print Suggestions on Haulage, Loading Stations and Mixer Equipment for Road Work—Koehring Machine Co.. Milwaukee, Wis.

Treatment of Industrial Problems by Constructive Methods—U. S. Department of Labor.

Metric Weights and Measures; Third Edition—American Metric Association, 156 Fifth avenue, New York.

Matthews Full Automatic Lighting—Matthews Engineering Co., Sandusky, O.

How to Make Hay Beds, Grain Beds, and Stock Racks—Allith-Prouty Company, Danville, Ill.

Data on Waterproofings, Dampproofings and Technical Paints—General Fire-proofing Co., Youngstown, Ohio.

Casco Waterpoof Glue—United States Plywood Co., Inc., 3 West 14th street, New York City.

Instructions for Applying Kragstone Stucco—American Magnesia Products Co., Chicago.

"Own Your Home" Elevations and Plans—National Lumber Manufacturers' Association, Chicago.

Concrete Mixers — Jaeger Machine Company, Columbus, Ohio.

Data on the Use of Self-Centering Trussit and Steel Tile for Roofs, Floors, Ceilings and Partitions—The General Fireproofing Co., Youngstown, Ohio.

Catalogue of the Star Line—Comprising dairy barn equipment, stalls, stanchions, stock pens, litter, feed and milk can carriers, barn and garage door hangers, stock tank heaters, wire stretchers, hoists, coaster wagons, and hardware specialties—Hunt, Helm, Ferris & Co, Harvard, III.

Expanded Metal Lath Construction— North Western Expanded Metal Co., Chicago.

National Garage Hardware—National Manufacturing Co., Sterling, Ill.

A Farm House for \$1,000; the Secret of Building Low Cost Houses Through Proper Planning; by R. S. Whiting, architectural engineer—National Lumber Manufacturers' Association, Chicago.

The Seattle Plan of Home Building; by Carl Bush—Southern Pine Association, New Orleans.

Neponset Twin Shingles—Bird & Son, Inc., East Walpole, Mass.

American 4-Man Contractors' Portable Variety Woodworker — American Saw Mill Machinery Co., New York.

How "Americans" Helped Win the

There is a wealth of valuable information in the catalogues and trade literature which architects and responsible builders may usually obtain on request. Builders are wise who establish some system of filing this literature. Being able to get the right information at the right time may save many a dollar. What system do you use?

War—American Saw Mill Machinery Co., New York.

Historic Houses at Litchfield—The White Pine Series of Architectural Monographs; No. 3, Vol V.

A Short Account of the History, Organization and Procedure of the U.S.

The Farm House Competition announced in the January issue is now in the hands of the judges. The awards will be published at an early date.

Patent Office—The Patent Office Society, Washington, D. C.

"The Standard" Low Charging Concrete Mixers; Latest Improved Models—Standard Scale and Supply Co., Pittsburgh, Pa.

Twenty-Second Annual Catalogue XXth Century Heaters—The XXth Century Heating & Ventilating Co., Akron, Ohio.

How to Give Lectures on Accident Prevention to Workmen—U. S. Department of Labor, Washington, D. C.

Illustrations of Recent Cement-Gun Work—Cement Gun Co., Chicago, Ill. ...

The Hodges Electric Stucco Machine for Applying Plaster-Stucco Waterproofing—Hodges Stucco Machine Works, Cincinnati, Ohio.

Seven Million Candidates for Training; Training Bulletin No. 9—U. S. Department of Labor, Washington, D. C.

A Business Man's Experience with Industrial Training—U. S. Department of Labor, Washington, D. C.

Some Advantages of Industrial Training—U. S. Department of Labor, Washington, D. C.

Homes for Workmen-Southern Pine Association, New Orleans, La. This work is probably destined to become a standard reference work in its field. It is made up of a series of articles relating to the development of more than a score of the recent industrial housing projects in America. In connection with these specific examples, there are many general articles dealing with the financing, construction, adaptability, maintenance and the social features of the industrial housing problem. Each phase of the problem has been handled by an expert. Among the two score authors represented may be found the names of many of our most successful architects, town planners and builders. Each of these specialists has been assigned to a subject in which he is qualified; in this manner the entire field has been authoritatively covered. The value of this book to others beside those concerned with industrial housing, should not be overlooked. To any person interested in the erection of small houses it offers a veritable mine of information on planning and designing and contains many up-todate suggestions for economical and safe construction. The book contains 250 pages, 9x12 inches in size. It is copiously illustrated with reproductions of well selected photographs, drawings and sketches.



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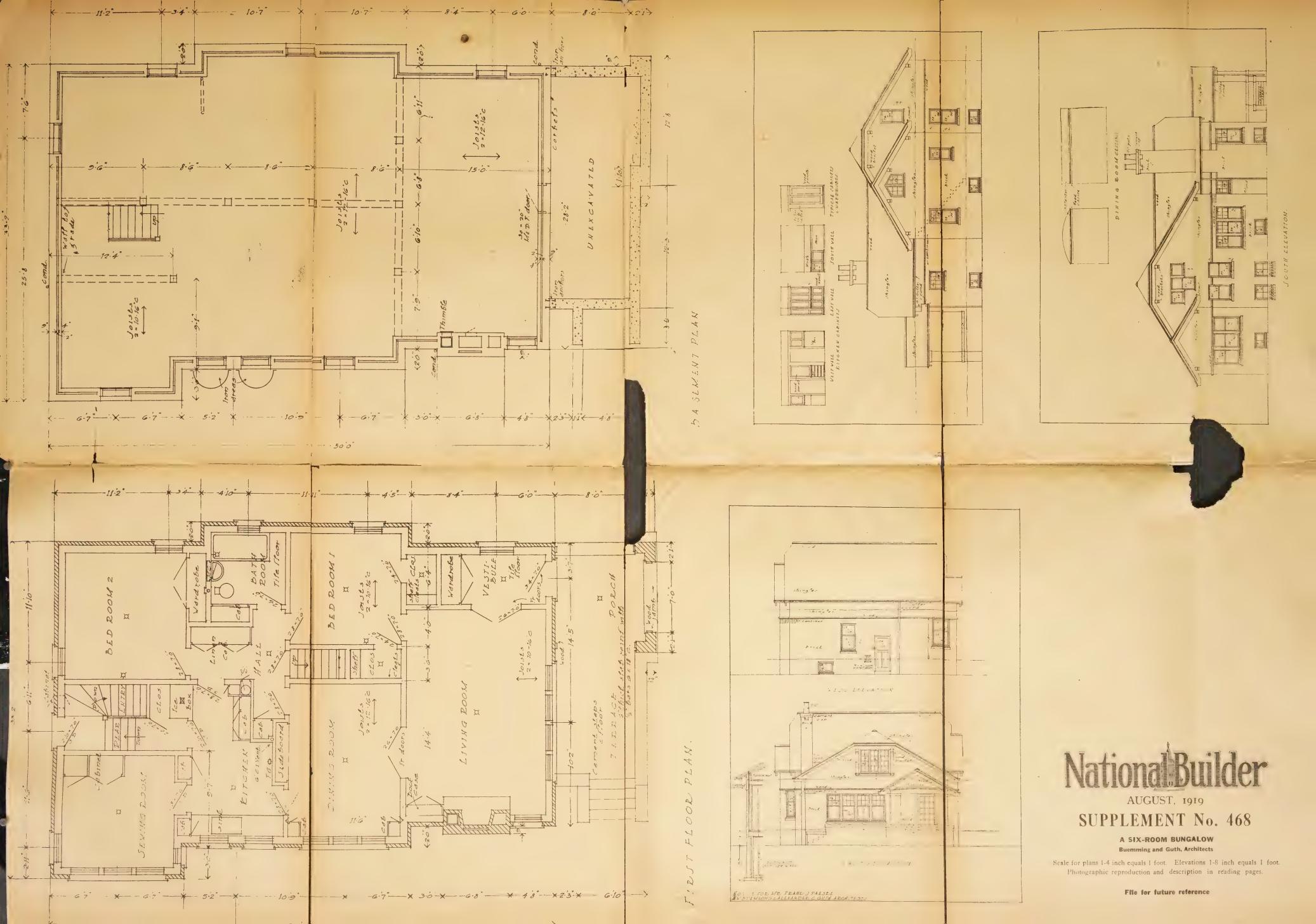


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Labor Question Is Now Uppermost...

JIM T. POMEROY, Associate

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August, 1919

No. 8

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This Binghamton, N. Y., home is shown, in the top picture, ready for Stuccoing. See those spaces between the wood strips of the Bishopric Stucco and Plaster Board? They are the dovetail keys which imprison the Stucco. Once Stucco is applied, it is locked rigid forever by these thousands of keys.

Note how the joints of the Board are broken every few feet. This strengthens the pur-chase of the keys by distributing the strain of the Stucco. The walls cannot sag or crack anywhere because they are completely unified.

ISHORPIC BOARD was nailed so securely to this building that the weight of the average Stucco wall—10 to 15 pounds per surface foot, could not possibly budge a single wood strip. Bishopric Board's resistance to deformation in the plane of the wall is extraordinary. No other Stucco base can be nailed so securely. The beauty of this Binghamton home is insured for its life. The Stucco will always be smooth and fresh looking. Repairs will never be necessary.

Bishopric Board is the background that prevents cracking of Stucco. It insulates perfectly. It also completely sound-deadens the home. It is the most economical Stucco base and gives the Architect and Builder an opportunity to provide special

ASPHALT MASTIC

CREOSOT-ED WOOD STRIP

DOVETAIL

conveniences with the savings made. One-third less plaster is required on account of the dovetail grooves. There is no waste—1,000 sq. ft. covers 1,000 sq. ft. of surface.

Bishopric Board is a combination of materials and principles that have been in constant and successful use for ages. It is protected in every way against the ravages of time and atmospheric change. It keeps the home always dry.

In interior use it saves plaster, time and labor, insulating against heat and cold and deadening sound to a remarkable degree. Bishopric Sheathing, our new product, saves 30 per cent as compared with 1/8 wood Sheathing and makes a solid, compact wall.

> Architects and Builders: Send for Booklet which tells your clients all about Bishopric Board. It contains the perfect Stucco mixture; reports of tests; and endorsements by Engineers, Architects and Builders

The Bishopric Mfg. Company

935 Este Avenue



Cincinnati, Ohio

NATIONAL BUILDER

Volume 62 Chicago, August, 1919 Number 8

Labor Question Is Now Uppermost

CUSPICION that someone is "get-D ting the best of it" is the main reason for the strikes that are holding back the waves of prosperity that should be flowing over the country. The wage-earners in each individual industry are "raising the ante" against the wage-earners in other industries. Little incidents show the mental influences that bring about impatience and radical action. "Straws show which way the wind blows." The wage-earners in a certain industry up to a short time ago had aprons washed at five cents each. They obtained an increase of pay. Thereupon the price for washing aprons was advanced to ten cents. If it had been six cents or seven cents the raise would not have made much impression, but a raise of 100 per cent in this insignificant expense collected around it all the irritations of the steadily increasing cost of living. Every little item of this kind in buying family supplies is taken hold of, enlarged on, and discussed, inflaming the minds of the people against "social injustice."

In the work of winning the war it was a matter of pride to see who could sacrifice the most. The warning that was uttered by President Wilson that the work of reconstruction would be more critical than the work of war was well considered. It is now a struggle to see who can hold his own in the "vicious circle." Wage-workers are necessarily their own competitors. They minimize their competition in any one industry by agreement—the trade union. But the competition of other industries on which they depend, for food, clothes, transportation, etc., presses on them and they cannot resist it, except by agitating to have their own wages increased.

Shifting Our Anxieties

We were anxious about the high price of building material. Now it is fairly well shown that the prices of building material are based on actual conditions, and not on profiteering. Our anxiety now is because of labor unrest.

Hardboiled Negotiators

Frank Henry Selden, in the American Journal of Sociology, puts it this way: Briefly, man's inhumanity to man is very largely the result of the inability of man to recognize the intelligence and worthwhileness of his fellow-man's labors." This is just as applicable to the wage-earner as it is to the employer. The wageearner has small conception, sometimes, of the amount of hard work, worry and anxiety—which is worse than hard manual labor-that the employer has to find the money for wages and keep the work going. There is an element of chance in all business. That is what the employer has to struggle with. So he in turn is inclined to think that the wage-worker has a pretty soft job. When the hardboiled agitators in both ranks strike sparks, there is a flare-up and a strike or a lockout.

Get a Close-Up View

Investigation by the one side of the conditions that are afflicting the other would do much to bring them together in an effort to pull together to relieve the situation. The representative of labor or the representative of the employers, if they are willing, can readily find a medium to bring them together.

National Investigation On the High Cost of Living

A resolution has been introduced in Congress, July 16, proposing a national investigation of the high cost of living by a committee of 12 to be appointed by the President.

A Self-Governing People

We have the ballot with which to elect men to frame the laws and carry out the provisions of the laws that we want to live under. But it is claimed that there must be a great clearing out of legal delays before the people will do away with "direct action" as typified in the strike and use the constitutional means to make reforms effective. The national investigation of the high cost of living, it is claimed, cannot work fast enough to bring immediate relief—and immediate relief is wanted.

Contractors and Building Supply Dealers Strike

In Chicago the General Contractors and Supply Men have stopped all work, anticipating the strike of the building trade workers. Thousands of men are idle and millions of dollars of construction work is suspended. Federal mediation has been suggested and meantime the committees of both interests are in secret conference.

Keeping Busy

In this seething turmoil of dissatisfaction, there is but one way out. Struggle to keep busy. If you elect to use non-union labor or are so situated that it is the only kind you can use, and you can get it, anticipate trouble, not by pampering, but in the square deal and keeping in touch with your men. If you are dealing with union men keep in touch with the laws of the Federation of Labor and know your rights under those laws.

The people must have buildings and homes, and the more construction work is taken on the sooner will we come back to a normal and prosperous condition.



THE signing of peace is the signal I for business and industry to take the helm. The great call of patriotism has been answered; the huge work of reconstruction lies before us.

Production is the order of the day. Labor and capital must each do its part. If production be neither stinted nor curtailed, the country faces an era of great achievement.

A mighty spirit moves the nation -a new Americanism born of the war. It is devoted to Service. Our soldiers are imbued with it; we all feel it; business and industry throb with it.

The Spirit of Service—a titan of wondrous power—is loosing his thunderbolts for conquest.

Work is the slogan of the hour! In these words in a full page display in the daily press, with the decorative features here reproduced by permission, Marshall Field & Co. heralded the announcement that Germany had signed the peace terms. Can We Make It Go?

Right on the heels of these hopes and aspirations comes news of strikes and lockouts in all descriptions of industry—but notably in the building trades. Public works were urged earlier in the year to provide

work for the unemployed. Building began to take on great activity and skilled labor has become scarce —notably carpenters. The scales of wages for carpenters at present are as follows:

Atlanta Co	¢Ω 6Ω
Atlanta, Ga Albany, N. Y	\$0.00
Albany, N. Y.	/5
Batimore, Md.	70
Buffalo, N. Y.	70
Boston, Mass.	90
Chicago, Ill.	92½
Cleveland, Ohio	,85
Cincinnati, Ohio	70
Des Moines, Ia.	75
Detroit, Mich.	70
Duluth, Minn.	.70
Galveston, Texas	.75
Hartford, Conn.	.75
Indianapolis, Ind.	.75
Kansas City, Mo.	85
Los Angeles, Calif.	70
Louisville, Ky.	.60
Memphis, Tenn.	.75
Milwaukee, Wis.	.70
Minneapolic Minn	75
Minneapolis, Minn. New York City	/ J
Oklahoma City, Okla.	773/4
Dhiladelahie De	80
Philadelphia, Pa.	80
Pittsburgh, Pa.	90
Portland, Ore. Providence, R. I.	80
Providence, K. I.	80
Rochester, N. Y.	80
Salt Lake City, Utah	80
St. Louis, Mo.	821/2
Toledo, Ohio	70
Washington, D. C.	87 1/2
willington, Del	/0
Wheeling, W. Va.	75

Work Will Go On Even at These High Wages

Even at these high wages work would go on if wage-earners in these trades would realize that the wages

can be increased by production, reducing of costs, so that the money they receive would buy more. Immense stores of foodstuffs have been held in storage by the war department. It is now to be released, with the expectation that this release will have an appreciable effect on food prices. Better marketing facilities are being worked out so that farm produce will not be subject to several profits to middlemen before it reaches the consumer.

Public Works Suspended

July 23 announcement was made that fearing the labor shortage would increase the cost of private work Secretary of War Baker had suspended the promotion of construction of public works. than \$450,000,000 is recorded under contract. The order discontinuing the work gives this explanation:

"From various sources information received indicates that there has been a general clearing up of the industrial situation, an increase in the amount of general production, a decrease in unemployment, and in fact many localities report a shortage of labor. From the point of view of the war department as well as from a general economic standpoint, the

stimulation of public works was one way of overcoming a crisis in the employment market, particularly as regards discharged soldiers."

But the statement says that this crisis seems to be passed and then adds:

"In short, special activity of public works has been regarded as most desirable in a time of stress, furnishing a reservoir to absorb labor in periods of idleness, but if this activity is continued in a time of general commercial activity which is now confronting us, it would have a tendency to shoot up prices and deter private building which, after all, is the primary public need and the source of production and taxation. Thinking along these lines it now seems advisable to discontinue the stimulation of public works immediately."

Must Keep Moving to Get Anywhere

While building is being hindered to a great extent there is an immense amount of building going on. This is the safety-valve. Building is a basic industry and from it flows occupations for many other industries. The means that are being worked out to enable even men who are living in the slums to own their cwn homes is most hopeful. The rising tide of the demand for homes must keep building on the upgrade.

Bolshevism

The American Federation of Lator is fighting bolshevist propaganda. It has gone on record that the strike shall be the last recourse. Now it seems to be the first recourse with unorganized as well as

some organized labor. Both descriptions of workers are striking. Local organizations of the Federation of Labor, defying its authority, are calling strikes, and it is here that the greatest difficulty is experienced. The sane labor counsellor is accused of having "sold out." He cannot say much against radicalism in the open, though fighting for conservatism behind closed doors.

Retraining Men

The work of the Federal Board in re-educating disabled soldiers is showing remarkable results. More than five thousand disabled men are now in training, being fitted to earn a livelihood, in many instances, much better than the one they followed before the war. The fortitude of such men and what they are doing for themselves and for society gives a lesson of patience and forbearance to all industrial workers and industrial managers. The future may produce a condition that will permit such education to be extended to those who by the necessity of earning a living have been forced into unsuitable occupations, and the reeducation of misfits be undertaken in such a way that they can be given a "hand up" out of the depths.

Restriction of Immigration

The restriction of immigration is called for by the Federation of Labor. Naturally the restriction suggested is more drastic than the employing interests think desirable. Also, there should be discrimination in the matter not only of numbers, but of the kind of immigrant that shall be admitted to these shores. It is quite probable that this country

prohibiting the manufacture and sale of whisky, wine and beer will not be so attractive to immigrants as heretofore, and this may, to a large extent, help to meet the ideas of the restrictionists.

Wheelbarrow Labor

The importation of Hindoo, Chinese or other foreign labor is a doubtful recourse, as likewise is the transfer of negro labor from the south. This class of labor may be easy to get but hard to manage, and racial prejudices soon raise a storm that is hard to quell.

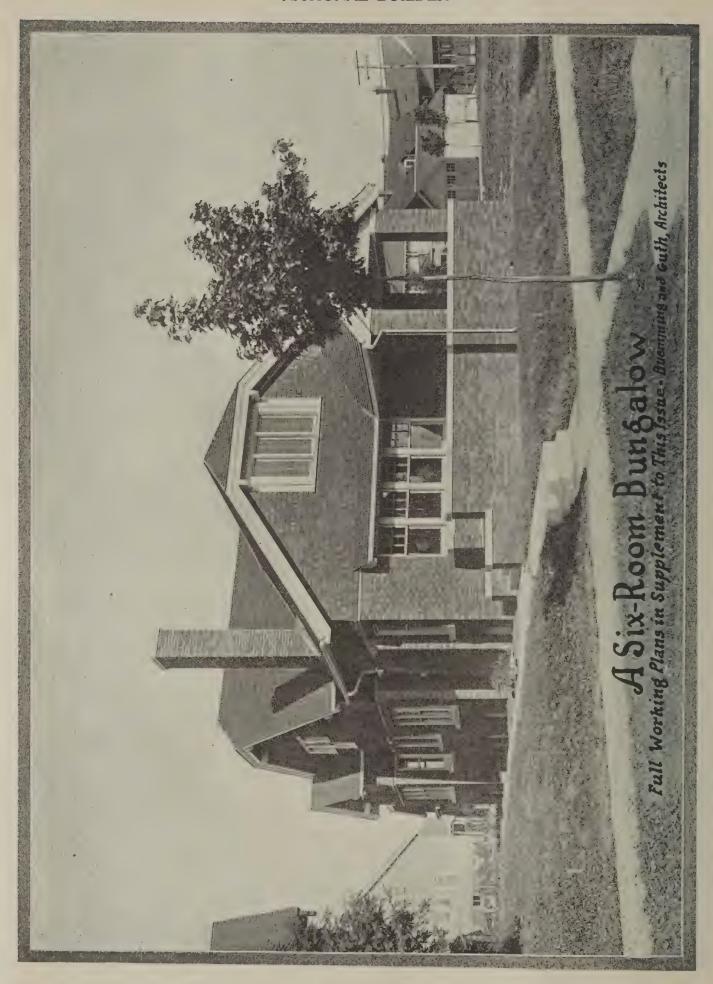
Machinery

That there is a great deal of ignorance of the labor-saving power of machinery of various kinds is unquestioned. On a wider knowledge of these resources and on the development of greater personal efficiency and better ways of doing the safest, dependence must be placed. The efficiency engineer, instead of being the enemy, is the best friend of the American mechanic and upon a hearty, cordial co-operation between these—a single-minded interest in the work to be done rather than in the ultimate reward must we look for that productiveness that will settle most of our labor difficulties.

Transportation

The immense crops that are being heralded this year will tax all the resources of the railways to move. It is now being urged that orders for building material be placed as soon as possible so that the inevitable congestion may be relieved. We may look for a great development of motor-truck freighting with the improvement of the highways.





A Six-Room Bungalow

Supplement 468

ONE of the most interesting phases of building is the fact that there is so much variety of form involved. Houses are similar to men; millions of each have been created and yet it is very seldom that we ever see two flats that have the same appearance. Even when we do find a marked resemblance between men, their difference in character will distinguish one from the other. So it is with houses. Superficially two houses may have the same appearance, but if we compare them carefully we usually discover that they have marked differences in plan or arrangement.

All of the above has no particular application to the bungalow which is to be described below, except that it is written to attract your interest and offer a hint that perhaps there is something to be learned from a study of any carefully thought out plan.

This bungalow was designed for Mr. F. J. Paeske of Milwaukee, Wisconsin, by Buemming & Guth, Architects. It contains six rooms and bath, a large attic and a full basement. The exterior wall construction is of brick with shingled gables. The roof is of wood shingles and the porch and terrace are of concrete. An interesting feature of this building is the fact that secondhand framing lumber has been used throughout. This old material was carefully selected and made it possible to use a superior quality of lumber at a cost less than is usually paid for ordinary framing material.

The photograph was made during construction and of course does not show up the building to its full advantage. The somewhat raw and barren appearance will disappear when the lawn is sodded and the planting is done. The bricks used are of the type known as "tapestry" with the rough surfaces and soft colorings which are characteristic of these bricks. The colors selected are reds in different shades with a few purples here and there to add variety. The shingles in the gables are stained a dull green. The truncated gables relieve the roofs of any feeling of stiffness at this point, and the verge boards are kept close to the walls thus avoiding the "cardboardy" effect that wide gable projections always have

One unusual feature of this plan is the vestibule. Most bungalows have the entrance directly into the living room. This doing without a vestibule may be well enough in warm climates, but even in such a locality a vestibule will keep a great deal of dirt and mud out of the living rooms. A builder should insist on putting the owner wise to these features. Of course, if the owner doesn't care to go to the slight additional expense that is his business, but he should never have any just cause for blaming his builder for not being up-to-date enough to warn him beforehand.

The vestibule is equipped with a wardrobe for coats and rubbers. The floor is of tile and French doors give it that "open" feeling that many owners demand. The living room opens into the dining room through French doors. The old method was to have a wide cased opening between these two rooms, but such an arrangement is not always satisfactory, as there are times when it is desired to shut these rooms off from one another. French doors permit the opening to be closed and yet the "open" feeling is retained.

The working plans of this bungalow form the Supplement to this issue. They are photo reproductions of the architect's original blue prints and have not been redrawn.

The living room fireplace is of tapestry brick with a bookcase and high window on one side and a full window on the other side. Direct access from the living room to the front bed room is provided.

The dining room has a built-in sideboard flanked by two doors, one of which is double-acting and leads to the kitchen, the other leading to the rear hall. The dining room has a plaster arch ceiling and is lighted by a large triple window which has built-in china cabinets on each side.

The kitchen is irregular in shape, but seems to be well arranged, although its four doors will probably prove a source

of some annoyance to the cook. The kitchen contains a built-in kitchen cabinet, a broom closet, a pot cupboard and a utility cabinet at the sink.

The sewing room is a good feature that is appreciated by a tidy woman who hates to have scraps and loose threads lying all over the place every time a garment is made. The built-in cabinet in this room provides a handy place to keep unfinished materials and clothing that is out of season. This room may be used as an extra bed room for

Bed room number two has good crossventilation and plenty of wall space for arranging beds. The built-in wardrobe in this room is far superior to the ordinary closet as it may be thrown wide open thus exposing all of its contents to immediate view. The placing of the windows in the extreme corners of the room gives the maximum amount of ventilation, but the window next to the wardrobe should be far enough away so that the open door will not cut off the light. Bed room number one has two roomy closets, but has but one window and lacks through ventila-

The bath room contains a built-in cabinet with sliding doors, this makes a convenient receptacle for towels, soap and so forth.

The hall contains a large linen cabinet and a handy cabinet for brooms. A metal-lined clothes chute opens from the hall, and the stair to the attic begins at this point.

The rear entry is of the grade line type with a stair to the basement and a short flight up to the kitchen floor level. This entry contains a cooling cabinet, a storage closet and the builtin ice box. The latter opens into the kitchen.

The basement is built of bricks laid up with an air space to form a hollow wall. The floor is of concrete, with cement finish. The two larger windows have areas made of sheet iron bent to a semi-circular shape. The basement contains the hot water boiler which furnishes the heat for the rooms-

The floors throughout the first story are of oak. The living and the dining room trim is of oak, while birch trim is used elsewhere. The windows on the principal elevations are of plate glass. All windows and doors are weather stripped and the exterior walls are covered with heavy insulating fabric.

The High Cost of Inefficiency

By Charles E. White, Jr.

That's what the trouble is, sometimes; not the high cost of building so much as it is the high cost of carelessness. A little more brainwork and a little less indifference on the part of foremen and mechanics may be the means of saving the contractor from reduced profits if not actual loss

CONTRACTORS and their organizations sometimes get "set" for a particular way to do business. As years go on they form opinions about the way to

Most face brickwork on ordinary jobs, as all contractors know, is laid overhand, from inside the building, and a good face brick mason can do a good job in this owner will get full value for his money. They don't want it to be "skinned."

The contractor, honest and wise, can help to bring about the right result. By a little more care in handling the job he can keep down the cost and at the same time deliver a good building to the owner without cutting his own profit.

Places to Save

One of the biggest little places to save money in labor is in choosing the right man for each job, and the shrewd contractor is so familiar with the characteristics of every man that he knows precisely where each is strongest and where weakest. You can't expect a mechanic to excel in every branch of his trade. He may be a good all-round man but you will always find that there is some part of the work which interests him most-some place where he works most efficiently and accomplishes the largest amount at the least expenditure of time. When you find that place for a man, keep him in it as much as possible.



Plate A—The "Western method" in which the brick are "buttered" on the edges and then bedded on a trowelful of mortar is said to be the fastest way to build a good brick wall. The number of "motions" your mechanics make will be reduced if you keep them well supplied with brick and mortar

go at it, and as each job comes along every man in the organization does his particular stunt in the way he is trained. But all jobs are not alike. In fact, it might be said that all jobs are different. The way to go about one job may not be the successful way to go about another. Here is where brains count; to size up each job on its own merits, arrange for the work according to the requirements and not be too much controlled by the methods used in previous work; which, after all, may have been a very different problem from the new one.

Contractors should not make the mistake of insisting upon hard-and-fast, cut-and-dried methods of building. The fundamentals of building are the same, of course, in every job, but the details of how to run the job and how to do the work should vary to fit the job. You may have a fine job of face brickwork to do with ornamental patterns to form in the wall, making it necessary to scaffold outside the wall so your men can see what they are doing—but that doesn't mean you should scaffold every job.

way though he looks at the wall "upsidedown."

Cheap But Good

There is even a time and place for cheap work, else how can a man who wants to build a \$5,000 house get his home? It is unreasonable to expect as fine a job on a \$5,000 house as on a \$25,000 house, and owners and architects who have had experience in building recognize this fact. This brings up the very delicate point—when is a cheap job "skinned"? At what point in the work are we to say "that is a good cheap job," while that one is "skinned" and not up to standard?

Specifications

Architects who draw up specifications for a small house which must be cheap but good can materially reduce the amount of the bids by specifying Iess expensive materials, less costly construction and less perfect workmanship. But these architects don't want a poor job. They want the building to wear well and be all that it claims to be so that the



Plate B—No elaborate cut-stone water table on this job. The "soldier course" at the bottom of the wall is entirely practicable; on this porch the brickwork stops at the top of the window frames, consequently no angle-iron is needed over the window as the gable above is of frame instead of brick. Contractors should encourage any construction that tends to reduce cost

Not long ago an architect made complaint about a workman on one of his jobs. He didn't like the work he was doing and resented his personality, which was of the fresh, know-it-all type. The contractor took the man off the job but didn't discharge him. He put him on other jobs and watched him. After a few days he gave him a remodeling job to do, one of those puttering, mean jobs of tearing down old work and building up new; the kind hated by most mechanics, in which, too often, the contractor sinks more than he takes out. But the man made good on this usually despised work. It developed he had done similar work before, and he enjoyed the comparative freedom and variety in such work more than he did the straight-forward work on a regular job.

He made a hit right away. The owner was pleased and the contractor was pleased. The mechanic kept his job, and

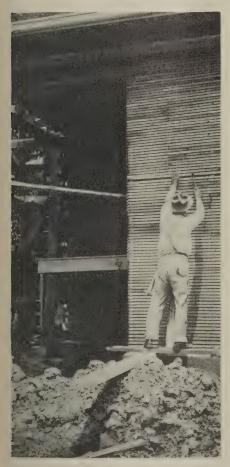


Plate D—Wouldn't a scaffold, or at least a box to stand upon, help this man to work faster and with greater ease? Are any of your men working to disadvantage? Are any of them lifting, pushing, straining because they haven't a block and tackle? Make the work easy for your men and they will make easy money for you

he is now foreman in charge of all the repair work which comes to that firm and is helping his boss build up a good repair business by the careful way he handles all such commissions.



Plate C—Without any increase in cost this roof might have been two feet higher, eliminating the dormers and making better head-room on the second story. Query:

Would the owner prefer it that way if he had known?

Formerly carpenters could do any sort of carpenter work and do it well. Framing a big building was no trouble, no matter how unusual the roof. The same man who could frame was equally proficient in putting up cabinet work, making window frames or building stairs. You must remember in contrasting oldtime mechanics with modern workmen that the item of time was not so important as it is now. Wages were low and it didn't make any great difference whether it took twenty minutes or an hour to mortise a lock in a door, so long as the job was well done. It makes a difference now, however-a big difference. With high prices in vogue for both wages and material and an irate owner struggling to keep down the rapidly mounting cost of his investment, there isn't any time for puttering. Every man must be put in the right niche. He must go quickly about his task, make no mistakes and deliver a good job, promptly. Consequently he is highly trained along certain lines and probably lacks in others.

Find his bent and keep him at that kind of work. Don't expect him to jump from one thing to another and prove efficient in all. A man in the wrong place will spoil your profits. The same man in the right place might prove a winner.

Methods of Laying Brick

As an example of a cheap but good method of laying brick you can find none better than the so-called "Western"

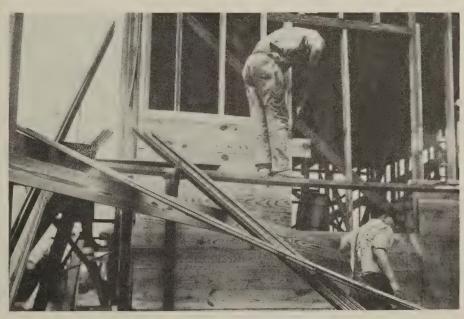


Plate E—While this carpenter saws the laborer fetches. To keep down your labor cost it is better to keep the skilled mechanics busy at their trade and have all the carrying done by less costly laborers. Don't let your high priced men reach around; have everything within reach



Plate F—The plain members of any cornice can be purchased at the lumber yard cheaper than at the mill. Many contractors are not onto the fact that they save money when they list their own mill work. In this way they can eliminate much of the plain material formerly bought at the mill, and buy all plain boards, at less cost, at the lumberyard

method (Plate A) in which a bed of mortar is placed on the wall and each brick placed thereon after two edges have been "buttered" with mortar. If the bed of mortar is of the right consistency (somewhat soft), each brick pushed in place finds a firm bond, the buttered edges of one brick adhering tightly to the next one.

The old-fashioned method practiced in the East included a full bed of mortar, each brick laboriously pushed into place and then the joints between brick carefully slushed up with mortar, often requiring several more taps of the trowel to bed the brick, and several more movements of the trowel in slushing each brick than is required by the Western method. The latter builds a wall amply strong and at a considerable saving of time.

Now, of course, a very cheap job could be skimped still further by reducing the amount of material in the bed of mortar and slighting the buttering of the joints. The skillful bricklayer, however, will turn out a firm wall without skimping, and in the shortest possible time.

Old-Fashioned Methods Wasteful

Many architects' specifications are out of date when it comes to brickwork, still specifying obsolete methods no longer practiced because too slow. If architects insist upon clinging to old-fashioned ways they will have to pay the penalty of increased cost of the work. With the present high cost of labor and materials the owner's interests are more faithfully safeguarded by introducing later and more efficient methods and the architect's specifications should lead the way along the paths of progress. Architects

who have for years been using the same clauses in their specifications for brickwork, cement work and stone work, as well as the same grades of lumber, would do well to re-vamp their specifications along more modern lines, keeping abreast of what is now considered the best practice—to conserve, but not at the expense of good workmanship.

The elimination of a watertable on a brick house is often the means of reducing the cost, for after all, though it has been the habit to use a cutstone watertable, the latter serves no necessary purpose. A row of headers or a "soldier"

course beginning right on top of the foundation wall looks well and is entirely practicable (Plate B). Reserve the more ornamental watertable for houses where cost is not of the first consideration.

Architects in making plans are often led into minor extravagances in order to secure some coveted type of design. Take, for instance the partially completed house shown in Plate C. Every contractor knows that this house would cost no more if the roof had been raised about two feet higher and the dormer windows eliminated. Of course, some of the bungalow type would have been lost in the change but the second story rooms would have gained in value. Perhaps the owner, himself, if he had been consulted, would have preferred a higher roof if he had known it would cost no more or might, indeed, have cost less.

Keeping Owners Posted

Contractors who deal direct with owners can be helpful and serve the interests of their patrons by informing them on these points. For instance, many owners think bungalows are cheap, whereas, foot for foot, they usually cost more than two-story or story-and-half houses. As all contractors know, it is cheaper to go a little higher in the air and get bedrooms on the second story than it is to spread out on the ground to get bedrooms on the first story. Some owners are willing to pay more for the increased convenience of a one-story home, but others would be glad to save the increased cost. It is just as much the duty of the contractor to help educate his acquaintances on these points as it is the duty of the architect.

Never let one of your workmen reach too much in his work; have everything



Plate G—Many contractors are specializing on cement concrete construction. The cement gang includes a carpenter or two to build the forms, and, of course, a concrete-mixing machine. Often, a gang like this is kept going the year round, except in extreme weather

thandy for him if you want him to accomplish the most in a day's work. A scaffold on the wall, illustrated in Plate D, or, at least, a box to stand upon might have saved time. Undoubtedly, a scaffold was used for the upper wall and roof soffit, but a couple of boxes below, with a plank bridging across would have been a little handier than reaching.

Small Leaks and High Wages

With mechanics' wages now a dollar an hour in many parts of the country a single hour's loss per day means a loss of one dollar per day to the contractor. If a man wastes five minutes here and ten minutes there he quickly gets up to an hour's loss per day; if you have five men on a job and each man losing half an hour to one hour per day by careless, wasteful methods you can see how quickly it mounts up in dollars and cents.

Laborers

It pays to have plenty of laborers to attend to the more highly priced mechanics. If one or two carpenters are up on the scaffold don't let them jump up and down as often as they want a board; have the lumber brought to them by a laborer (Plate E). Of course, you don't want laborers standing around, but a little care in assigning men to the different jobs will make it possible to keep all skilled mechanics hammering, sawing, laying brick, screwing up pipe or what not instead of chasing around fetching and carrying their own supplies.

Saving in Millwork

In the millwork for a small house a little care in figuring over the lumber bill may save considerable waste. Get timbers as nearly the right length as possible to eliminate all waste. Much of the material formerly purchased at the mill can be bought at the lumber yard. For instance, for a box gutter in a cornice you can buy the gutter-molding at the mill, but the plain board below (Plate F) can be purchased at the lumber yard, usually at less cost. In taking bids have the mill include only the molded work, and include all plain boards whether for cornice or elsewhere as part of the lumber bill.

Cement Work

In the evergrowing demand for cement work for foundations as well as walks and driveways there is a good chance for contractors to make good money, but like every other kind of work, the profits are soon eaten up if the work is not well handled (Plate G). The cost of building the forms for foundations is sometimes considerable, especially when a foundation is very irregular in shape. Many contractors have found that a system of ready-built forms saves on cost. These come in small units and can be put to-



Plate H—The man behind the gun is your skilled mechanic. He, really, is the man who makes or breaks your profits. Select him wisely and with great care, and take mighty good care of him when you get him. Build up a good organization of high grade men and keep enough work going to keep them busy; this makes the ideal contracting business

gether in any fashion to build a wall of any size or shape.

Get High Grade Men

As to the grade of mechanics you employ on your jobs you will of course get the highest grade to be had. What you want are capable, self-reliant, faithful, energetic mechanics (Plate H) who will use their brain and brawn for the good of the boss. Build these into your organization, and when you have once built it try and keep enough jobs going all the time to keep your men. It sometimes takes years to build up a good building machine, and one of the principal things is to hold your machine after it is built, and not let any of your men get away from you by reason of slack time. For this reason many contractors are willing to cut down their profits to

secure work in slack times to keep their organizations going.

Steel scaffold brackets are also recommended by many contractors as a money saver. They can be quickly bolted in place and taken down again, and are light to handle, strong enough to support any load, and will last for years.

OWN HOME BILL INTRODUCED

An "Own your own home" bill, prepared by the Department of Labor, has been introduced at Washington by Senator Calder, Republican, of New York, and referred to the Banking Committee. A Federal home loan board and home loan banks would be established through which \$2,000,000,000 in assets of building and loan associations throughout the country would be made immediately available for home building.



A partial view of Clyde, California—a system of boulevards and parks has been laid out including parking strips 60 feet wide between the rows of houses

ONE of the distinguishing features of the Panama-Pacific International Exposition was the lavish use of color in the composition. This use of color was confined not only to the details, but in-

Shipbuilding Company at Clyde, California.

Much time and study have been spent in laying out various industrial towns with the aim of avoiding monotony and out with winding curves. All for the purpose of obtaining variety. Usually, however, scant attention has been paid to the color scheme beyond that afforded by the natural colors of the materials in



Fig. 1



Fig. 2

Fig. 1—Side view of Hotel Clyde showing pavilion at left. The pavilion's height—30 feet—insures coolness and will also accommodate moving picture screens. It contains a music balcony and a maple dancing floor with 1,000 feet of surface. Fig. 2—One of the hotel dining rooms. Provision has also been made for dining pergolas and for a terrace garden where dining tables may be placed. The kitchen equipment is said to be without superior in the suburban hotels of the west

cluded the buildings as well, and played no small part in contributing to the success of the group.

This practical example of the possibilities in the more extended use of color, is no doubt responsible for the adoption of a similar scheme for the new housing development of the Pacific Coast

sameness in the houses. Different elevations are developed from the same plans; houses are reversed and turned so that they show different sides to the street; houses that are similar in appearance are placed far apart; different materials are used on houses of the same type, and the streets and roads are laid

masonry houses or the uniform hue given to the frame ones. Even in those comparatively few developments where a socalled color scheme has been adopted the problem has often been attacked in a half-hearted manner and the results are disappointing.

Most of us seem to be afraid to use

color. Deep down in our hearts we confess to a liking for bright reds, and blues, and yellows, but we're afraid of other people's remarks and most of us compromise by painting our houses with dull grays or drab browns. Of course, it would be absurd to set a lemon-vellow

boxes, because of their uniform color treatment.

The builders of Clyde have rejected the usual method of employing color. The conventional colors, or lack of them, have been displaced by bright ones. This novel color scheme, however, was not

Each building was a problem in itself, but all were carefully studied with constant reference to the final effect of the whole, including the surrounding land-

The principal color used in the town is yellow. This color is clearest at the





Fig. 3

3-The houses are unusually well built. The building requirements are said to be similar to those customary in cities of 200,000 population. Fig. 4-In finish the houses are varied. Shingles, rough sawed siding, or stucco being used singly or in combination





Fig. 5

Fig. 5—For the most part, the homes are of three, four, or five rooms, but some have as many as nine rooms. The house in the photograph at the left has seven rooms. Note the horizontal lines in the roof made by doubling every fourth course of shingles

house down in the ordinary community, where it would clash with everything in sight, but plenty of isolated farm houses and most new developments would be better for a brighter color note, providing it is carefully worked out. There is nothing that affords more variety than color, and we are all familiar with communities, especially housing developments, in which the houses altho well designed, look like so many similar pill

adopted on the spur of the moment, nor was it developed by men who had no practical knowledge of the harmonious use of color. Before a paint brush was laid on any of the buildings, a huge perspective drawing showing the entire development and the surrounding country, was laid out. Then, under the direction of artists Maurice Del Mue and Harold von Schmidt, of San Francisco, the entire scheme was worked out in full color.

hotel, which is the center of the composition. The town rises up gently sloping hills from the flats along Suisun Bay, where the company's shipyards are located, and as the houses move up these slopes the color treatment tends more and more to cooler tones. As a means of giving life to the composition, houses are scattered here and there with color treatments that contrast with those of their neighbors. The number of such

houses is so few that there is no danger of this trick being too noticeable.

It should be understood that this color treatment has not been carried out merely to attract popular attention, nor to make something different. It was felt that here is a new town, ideally located for such a study, here is an opportunity to try out a new color scheme, and so the thing was done. That it is fully successful may be gathered from the admiration which has been expressed by the many authorities who have had the pleasure of visiting the new town.

ican architects, Bernard R. Maybeck, designer of the Palace of Fine Arts at the Panama-Pacific International Exposition, and other highly important works. Although Mr. Maybeck is not the architect of any one house in Clyde, his interest is in no small degree responsible for the success of the development.

Other well known architects were also interested in the work, including G. A. Applegarth, who designed the \$150,000 Hotel Clyde, and also many of the homes. Other homes were designed by E. W. Cannon.

Stores, offices and similar requirements being provided for in the general plan. A smaller shopping district will be located at the eastern end of the town.

The Hotel Clyde is the most important building of the group. It is the center of the social and amusement life of the community, as well as supplying the more material needs. It contains 176 guest rooms, two dining rooms, and all of the features necessary for the comfort of its guests, including the ladies' rest room, and the unusually large shower rooms located on each floor.





Fig. 6

Fig. 7

Fig. 6—A combination living and dining room with a glimpse into the kitchen. Note that the back of the serving cabinet opens into the kitchen so that meals may be served through it. Fig. 7—The kitchen of the same house shown in other interior. Note the unusual arrangement of the cabinets and bins along the wall. Laundry tubs on the rear porches are becoming quite popular

The construction of Clyde was begun in August, 1918, and in the spring of 1919 the first houses were completed. There are 103 houses included in the first unit which is now nearing completion. The actual construction was done by the Clyde Company under the supervision of A. H. Markwart, San Francisco engineer.

Through the participation of the Government, Clyde was laid out with the advice of one of the best known of AmerThe latest methods and devices have been used in such matters as lighting and so forth. The public utilities representing the latest modern practice.

To further suggest the nautical tendencies of the town, the streets have been given names which touch on sea history, such as Trafalgar, Norman and Essex.

The main business district has been laid out in the vicinity of the hotel.

A number of the second-story bedrooms have balconies which may be used as sleeping porches, the heads of the beds being moved into the open for this purpose.

The big building is done in the Spanish Renaissance style, and both its broad lines and detail has been well adapted to the town and the surroundings as a whole.

Human beings are moving upward in the scale of living. They are demanding more of the things that make life pleasurable. To meet this unrest good homes are the first consideration. Large employers of labor all over the country are busy filling this want. Meantime there is impatience among workers who are being crowded by the high cost of living. They see evidences of profiteering. Their recourse is "direct action" — the strike. This makes bad matters worse. Production is the only way in which prices can be reduced. When the workers can be shown clearly that they are not "being worked" then there will be unity of action and sustained productivity, and prosperity for all.

A Variety of Styles

By Charles Alma Byers

REPRESENTING a variety of styles of home architecture, the four twostory houses here shown possess a multiple of points to commend them to the careful consideration of all prospective builders. Not only do they greatly differ from one another in structural lines and general outside appearance, but their interiors also show wide variation in respect to arrangement, finish, built-in features, and so forth. In fact, the suggestions conveyed by way of the floor plans in the matter of planning the interior of the home, particularly in reference to possible built-in conveniences, should prove especially interesting. And as making these houses more interesting still and to a larger number of persons, they have been selected so as to represent a wide variation in costs—the range of approximate costs being from \$4,300 to \$7,500.

House Number One

The first and least expensive house illustrated here is rather simple in outside structural lines, and yet, because of its dignified appearance, it is very attractive. Across the entire front extends an eleven-foot terrace, or uncovered veranda, which is floored with red ce-



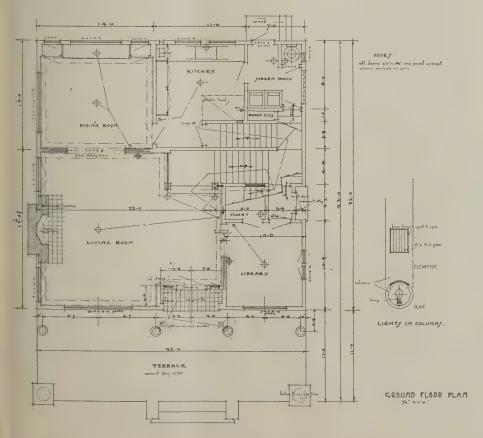
No. 1-Harold Bowles, Architect

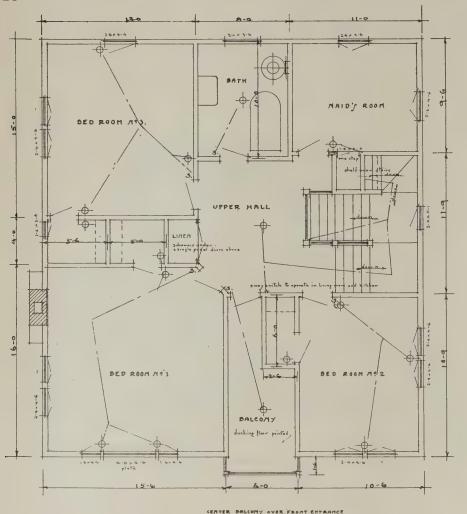
ment, having at each of its outer corners a sort of pedestal flower-box. The second-story portion projects outward a few inches along the front, by which is comprised the terrace's only protection, and

underneath this projection are stationed four plain round columns, helping to lend to the front a somewhat classic appearance. The entrance is recessed between the two center columns, and directly overhead is a deep loggia-like balcony, enclosed by a neat wood railing and protected by a small awning. The front door is of mahogany, and at each side of it is a narrow glass panel. From one end of the house extends a porte-cochere, of the pergola type, and into it leads a side door, to connect directly with the automobile driveway.

Particularly careful attention has been devoted to outside detail work, and the attractiveness of the house's exterior is not a little due to the care exercised in this direction. In addition to the details already mentioned, the matter of lighting also deserves notice, for the front entrance is not only lighted by an overhead globe, but an electric light is concealed in each of the center columns. A brass frame, hinged to open and striped with glass, is inserted in the columns so as to face toward the doorway, and inside this glassed frame is the electric globe. This arrangement enables the terrace to be illuminated in indirect fashion, which at night produces a very pretty effect.

The house has a frontage of thirtytwo feet and a depth, including the terrace, of forty-three feet. Its outside walls are covered with resawed siding, painted white, as is also the trimming, and the shingled roof is painted green. All steps and walks and the automobile driveway,





No. 1

like the terrace flooring, are of bright

On the first floor are living rooms,

a maid's room, besides the balcony already mentioned. The front door opens directly into the large living room, and



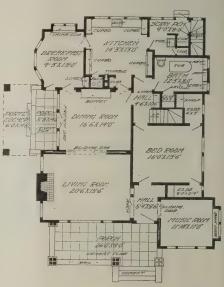
No. 2-W. E. Allen, Architect

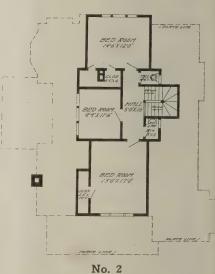
library, dining room, kitchen and rear screened porch, and on the second floor are three bed rooms, the bath room and

from this room also rises the staircase. Sliding glass doors intervene between this room and the dining room, and a

single sliding wood door is placed between it and the library. Besides the main staircase, a back stairway ascends from the kitchen, and from the stairway hall of the second floor direct access is had to all of the rooms, as well as to the balcony, of this floor. The driveway entrance leads into the library.

The built-in conveniences of the first floor include a combination of china closets, cupboard drawers and sideboard in the dining room, occupying the lower portion of one entire wall; a large closet in the library; a draught cooler, and a hood for the range in the kitchen, besides the usual cupboards, sink, and so





On the screened porch are a toilet, a broom closet and two stationary laundry tubs, these tubs having a hinged covering which forms a very serviceable table. On the second floor, each of the bed rooms, as well as the maid's room, has a rardrobe closet; the hall contains a linen cabinet, and the bath room has the customary fixtures, including a wall medicine case.

The ceilings of the living room and the dining room are finished with a wood



No. 3-H. H. Whitely, Architect

cornice, and the walls of the latter room and the library possess a paneled wain-scot, with a plate rail above. The woodwork of the living room and the library is of mahogany, and that of the dining room is of pine, enameled white, with the exception of the countershelf of the buffet, which is of mahogany. The living room contains a large fireplace, the mantel and hearth of which is of hand-made tile, of dull green—the threshold of the room being floored with tile to match.

The woodwork of the kitchen and of the second-floor rooms is of pine, enameled white. The walls of all first-floor rooms, except the kitchen, are papered, and those of the upstair rooms, except the bath room, are tinted and decorated with hand-executed borders. In the kitchen and bath room the walls are surfaced, to a height on line with the top of the window and door casings, with smooth-finished hard wall plaster, which is enameled white like the woodwork. With the exception of these two rooms, hardwood floors prevail throughout, while, in the rooms excepted, pine covered with linoleum is used.

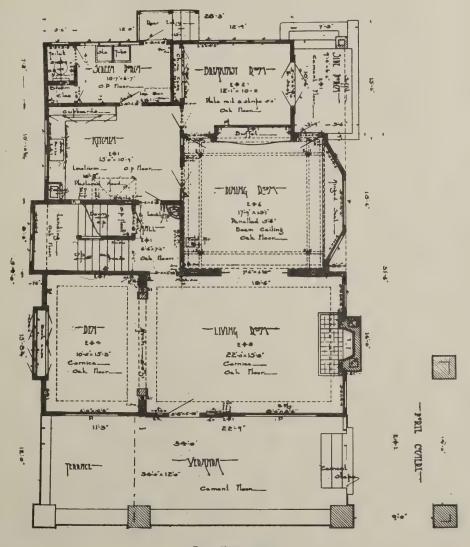
A portion of the house has a small concrete walled and floored basement, which is reached from a stairway descending from the rear screened porch, and also from the side entrance. The house is equipped with a hot air furnace. Located in Los Angeles, California, the house was designed by Harold Bowles, architect, of that city, and the cost was approximately \$4,300.

House Number Two

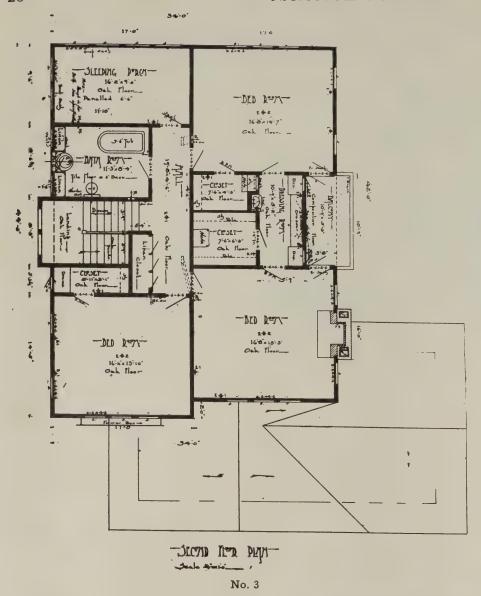
The second house shown here is of the bungalow type, and is really of the story-and-a-half kind. The outside walls are covered with rustic siding, which, like the finishing timbers, are stained a dark brown; the masonry work consists of concrete blocks, including even the porch railing, and the shingled roof is painted a very light green, while the slight trimming about the windows is done in cream, to match the concrete blocks. The structural lines are rather irregular, to conform with the bungalow style, and the general appearance is picturesquely attractive.

On the front is a roomy porch, floored with cement, and on one side, from which extends the roofed porte-cochere, is a smaller porch, also floored with cement. The entrance from the front porch leads into a tiny hall. From the side porch, French doors open directly into the dining room.

The first-floor rooms are living room, music room, dining room, breakfast room, kitchen, bed room and bath room, besides the customary rear entrance porch, and on the second floor are three bed rooms, as well as separate toilet and lavatory. The front entrance hall is con-



Joseph Marie Milli



nected to the living room by an open arch, and from this hall direct access is also provided to both the music room and the bed room. Back of the latter is a short connecting hall, which links this room, the dining room and the kitchen with the bath room, and from which rises the stairway. Double sliding doors intervene between the living room and dining room, and a single sliding door gives access to the music room. A short hall forms direct connections between all of the second-floor rooms.

The built-in features of this house are especially numerous and desirable. The music room contains an excellent bookcase, which is located in a sort of projection in one of the outside walls, with two casement windows above; the dining room has an artistically designed buffet; the breakfast room possesses both a china closet and a linen cabinet; the kitchen, which is of the so-called cabinet design, is especially well provided with cupboard space, as well as a small closet for pots and pans; the rear screened

porch has a laundry tub and two storage closets; the bed room of the first floor has two closets, each with shelves and a window; the back hall includes a cabinet of linen drawers; and the bath room, in addition to the usual fixtures, gives space to two linen cabinets with a box seat and a wall mirror between, and also has a clothes closet, while two of the second-floor bed rooms likewise have roomy wardrobe closets.

The living room contains a fireplace, constructed of soft brown tile. The woodwork of this room and of the dining room is of pine treated to resemble fumed oak; of the music room, it is pine finished in mahogany color, and in the remainder of the interior the pine isenameled white. The walls of all the first-floor rooms are papered, except in the kitchen and bath room, and in these they are finished, to a height of six feet, with hard wall plaster, enameled like the woodwork. The walls of the upstair rooms are tinted in attractive light shades. Hardwood flooring is used in the entrance hall, living room, music room, dining room and breakfast room, and pine elsewhere.

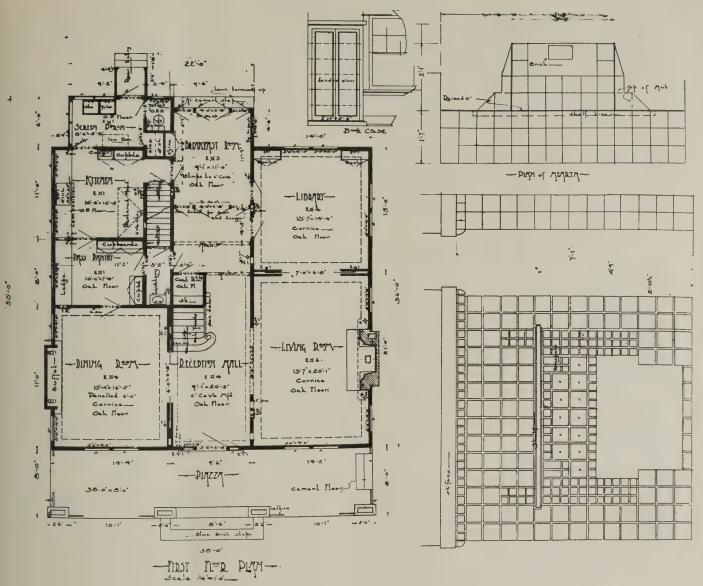
The basement is reached from off the rear porch, and there is a furnace to supply the rooms with heat. The cost of the house was approximately \$4,600, and it was designed by W. E. Allen, of Los Angeles, California.

House Number Three

The third house of the group, with its whole exterior finished in white, except for the bright red brick work, is dignified and imposing, and yet, with a width of but thirty-four feet and a total depth of fifty-four feet, including the front



No. 4-H. H. Whitely, Architect



No. 4

veranda, it is not exceptionally large. The walls are of shingles; the roof is covered with a white asbestos composition, and the brick work, of which there is a great deal, is of red brick, as stated, with the walls and pedestals of the porch finished with a white cement coping.

A combined veranda and terrace extends across the entire front, from one end of which projects a roofed portecochere, and on the rear corner of the driveway side is a small side porch. Both of these are floored with cement. On this side also, about midway between the front and the rear, is a delightful second-floor balcony.

The rooms of the first floor are living room, den, dining room, breakfast room, kitchen and rear screened porch, and on the second floor are three bed rooms, a sleeping porch, the bath room and a small dressing room. The front door opens directly into the living room, and a broad arch connects this room with the den, while sliding glass doors intervene between it and the dining room. A single

door opens from the dining room onto the side porch, and double glass doors give access to this porch from the breakfast room. Shut off from one of the rear corners of the living room by sliding doors is a small hall from which rises the staircase and which connects with the kitchen. On the second floor is a rather long hall which comprises a connecting link between all of the rooms on this floor, except the dressing room, which room joins two of the bed rooms. The balcony here is reached from these two bed rooms.

In the large living room of this home is the usual fireplace, the mantel and hearth of which are of hand-made tile, and in the bed room directly above, is another fireplace, also of tile. The den contains a built-in bookcase; the dining room an excellent buffet, as well as a long window seat with a hinged top; the breakfast room a china case; the stairway hall a closet and a lavatory; the kitchen all of the usual conveniences, including a draught cooler and a hood for

the range; and the screened porch two laundry tubs, a broom closet and a toilet. Each of the three bed rooms possesses a clothes closet of exceptional roominess, with built-in hat boxes and shelves; the dressing room has a complete built-in dresser and a wash bowl; the hall of this floor has a large linen closet; and the bath room is equipped with two corner linen cabinets and a medicine case.

In the living room, den and dining room, as well as in the lower hall, the woodwork is of Juanacosta, or Mexican mahogany, and elsewhere it is enameled in white and ivory. The walls of the two front rooms are covered with wall canvas, which is painted and stenciled, and the walls of the dining room are finished with a paneled wainscot and a plate rail, while the space above is papered. The three bed rooms are also papared, and the kitchen and bath room are finished with wainscot effects of smooth-surface hard wall plaster, enameled white. Oak flooring is used throughout, except in the kitchen, screened porch and bath room. The bath room floor is of tile, and the pine flooring of the kitchen is covered with linoleum.

There is a thirteen-by-fifteen-foot basement, which is walled and floored with concrete, reached by a stairway beneath the main staircase, and a hot-air furnace supplies the heat. The house was designed by H. H. Whiteley, of Los Angeles, California, and the cost, including garage and so forth, was about \$7,500.

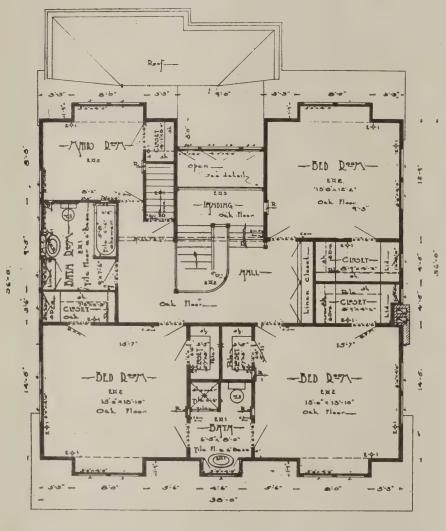
House Number Four

The fourth house here shown is an adaptation of the Dutch Colonial style of architecture. To a height on line with

lattices and the flower-boxes placed between the porch piers, and in each of the gables, at second-floor windows, are window-boxes.

The front door, which is of mahogany, opens into a large reception hall, from which rises the staircase. Directly back of this hall, beyond a sort of alcove which may be closed off with portieres, is the breakfast room, French doors and windows being used in both ends of it, so that one entering the front door may have a glimpse into the garden beyond. The other rooms of this floor are living room, library, dining room, pass pantry

closet; the library two corner book-cases; the pantry and kitchen the usual amount of cupboard space and other features; and the screened porch two laundry tubs, a storage closet and a toilet, while underneath the staircase is a closet for wraps and in the small back hall a lavatory. Two of the bed rooms have two large closets each, and the other bed room and the maid's room have one each, all of these closets being especially well planned in respect to shelves and drawers. The landing hall contains an excellent closet for the storage of linen, and both the shower room and the tub room

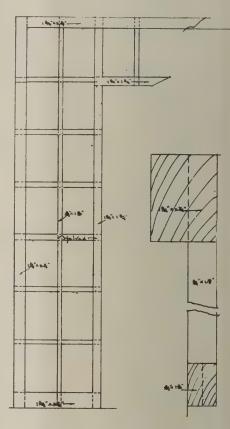


-Just 12°D Phin-No. 4

the top of the first-floor window casings, the walls are of white cement-stucco over metal lath, and the gables and the gambrel roof are shingled, the shingles being painted a light French gray, while all trimming is done in white, to match the stucco work. There is an eight-foot veranda across the front, which is floored with cement, and the piers, walls and steps of this veranda, and also the chimney, are constructed of red tapestry brick. Interesting details of the front are the

and kitchen, besides the rear screened porch, and on the second floor are three bed rooms, maid's room, both a bath and a shower room, and a small hall alcove. A back stairway ascends from the kitchen, and all of the upstair rooms are directly connected by a large landing hall.

In this house also are many delightful built-in conveniences. The dining room, for instance, contains a well-designed buffet; the breakfast room a small china



Detail of Mitice on Merandy

have wall medicine cases, while the latter also possesses a corner linen cabinet.

The ceilings of the living room, library and dining room are finished with a wood cornice, while the reception hall ceiling has wood cove, and the walls of the dining room, to a height of six feet, are paneled, with a plate rail above. All of these rooms, including the reception hall, are finished in mahogany, and the plastered walls are covered with wall canvas, which is attractively painted and handdecorated. The woodwork of the other rooms, on both floors, is of pine, enameled white, and the walls of the breakfast room, three bed rooms and maid's room are papered. Oak flooring is used throughout, except in the kitchen, rear screened porch, maid's room and two bath rooms. Tile is used for the floors of the bath rooms, including a six-inch

base, and the shower annex is tiled to a height of six feet six inches. The livingroom fireplace is of hand-made tile.

The house has a twelve-by-fifteen-foot basement, and is provided with a furnace and automatic water heater. It was designed by H. H. Whiteley, of Los Angeles, California, and the construction cost, including the garage, all outside cement work and all equipping, was about \$7,100.

All of these houses are substantially

and warmly constructed, and should be suitable for almost any location, since each is provided with a complete heating plant, as well as at least one fireplace.

Solving the Housing Problem on the Outskirts of Civilization



Copyright by Underwood & Underwood

This is the way the natives of East Africa get around the rent collector. They build their residences with poles, grass and rope, on free ground. After the houses are built there are no more expenses to be met until the houses rot down. The huts are put on high stilts to outwit another pest—the mosquito. The woman with a heavy stick in her hand is pulverizing grain to make bread for the next meal. This is one of the exhibits of the consequences of non-producing. The means to sustain life are easily obtained here. There is no incentive to work

A Brick-Veneered House

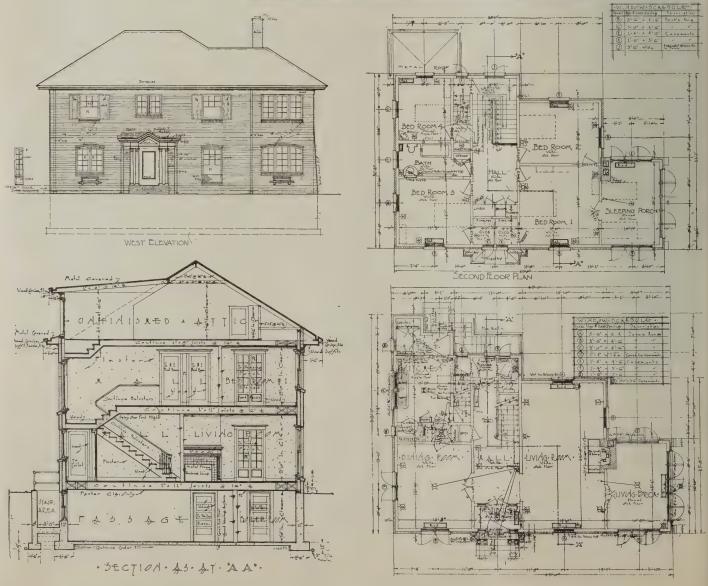
HERE is a house that is difficult to define. It has considerable English feeling, yet leans to Colonial as well. The detailing, especially that of the interior, as shown on the section, is Colonial, but there is considerable that is English in the general appearance of the exterior. In any event, it is attractive and full of interesting ideas for the builder and architect.

It might be supposed that the series of jogs shown on the plan in the back wall would make that side unpleasing in appearance, but the owner likes that side even more than the front.

Colonial Type

The plan is based on the Colonial type—a wide central hall with the principal rooms opening from it—but it is not strictly true to type and is a good example of the possibilities of varying from standard forms in order to meet modern requirements.





The arrangement of the dining room, kitchen, and rear entry is especially good. It will be noted that the usual serving pantry is here reduced to a mere passage which simplifies the work of serving meals. The relation of the kitchen to the hall, the first floor toilet, and to the back stairs, both the one to the second floor and the one to the basement, is well thought out.

On the second floor, the closets at one end of the hall are well worked out. The provision for brooms, etc., and for the storage of blankets during warm weather are always appreciated by the housekeeper. The small closet in the bath room for towels, etc., is also a practical idea.

Note on the exterior views that the frieze comes just above the second-floor windows. This helps to reduce the apparent height of the building and also does away with the steel lintels that would be necessary if the brick veneer were carried above the window heads. The small buttresses at the end of the living porch soften the lines at this point and add interest to the corners.

Automatic Cellar Drainer

The cellar floor of this building is below the level of the street sewer, and an automatic cellar drainer has been installed to prevent the flooding of the floor. This drainer is located in a small pit or sump below the floor and the entire cellar floor is given a slight slope toward it. The cellar drainer is operated by the city water pressure and requires no attention, as the operation is entirely automatic. When the sump begins to fill with water, the drainer starts to work discharging it into the sewer, continuing this operation until the cellar is free from water. The cost of these drainers is quite reasonable. One that under a city water pressure of 25 pounds will raise 200 gallons of water per hour to a height of 6 feet, will cost around \$35 or \$40. The cost of operating is almost negligible.

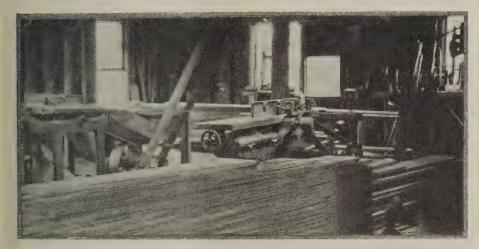
The construction of this house is brick veneer on frame. It was designed by Chas. E. J. White, Jr., Architect, for T. J. Bermingham, of Kenosha, Wis.

Keeping Work Going

WHEN building is not going on, how can you keep your men and how can you keep your plant investment earning something? That is a question that is in the minds of a great many builders. A firm of contractors and builders in Maryland, who are also dealers in lumber, millwork, and all kinds of building

ing his money working as well as his shop.

Mr. Boeger is a man of strong personality and wide acquaintance. He is a diligent student of the trade papers, and keeps NATIONAL BUILDER on file. He fills in odd hours and dull seasons keeping himself and his men busy making,



Upper floor of John C. Boeger's shop—White cedar in foreground for making cedar chests

material, wants suggestions for some kind of woodwork that can be developed into a permanent business to fill in the slack seasons and keep the men employed and a woodworking shop busy.

To start the discussion, we submit the experience of John C. Boeger, builder and contractor, of Arlington Heights, Ill. He buys lots and builds on them and says he sells the houses sometimes before they are completed. He has a good-sized two-story woodworking shop equipped with up-to-date machinery, and has his own truck and a Ford machine. He buys his goods in quantities and gets the whole-sale price and discounts his bills—keep-among other things, cedar chests, phono-

graph cases and cabinets of various kinds.

The "knackiness" that is developed in this practice keeps craftsmanship up to the mark and shows in the well-constructed buildings erected by him.

While the photograph does not do Mr. Boeger justice it indicates him as a practical man, fond of his business and successful in it. The illustration of the upper floor of his shop shows a pile of white cedar—a \$75 investment. This wood has a pleasing perfume unlike the strong aromatic odor of the red cedar, and the chests made from it by Boeger become heirlooms in the families of his customers.



John C. Boeger, builder, in his shop

His customers think more of anything made by John Boeger than of similar goods store-bought.

What is your experience in "keeping busy in dull seasons"?

Stucco on Wood Frame

THE popularity of stucco applied over a wood frame is growing more pronounced. It offers a comparatively cheap treatment where it is desired to There are three essential requirements for durable stucco. The workman must be skilled, not only as plasterer, but as an exterior plasterer. He



Stucco walls are monotonous unless the surface is varied by breaks. In this house the chimney and the hooded extensions of the roof assist in forming a pleasing composition

give an air of permanence to a structure. It is a sure way to give an old tumble-down frame house every appearance of a new masonry one.

A good job of stucco on wood frame offers many of the advantages which make solid masonry houses desirable.

One advantage lies in the low cost of upkeep. A clapboard house should be painted every three years, or at the most every five years. A stucco house does not require this expense, and the slight difference in first cost between the two materials is often wiped out by only one job of repainting. Stucco is also considered to make a house easier to heat in winter, the difference, however, is probably slight.

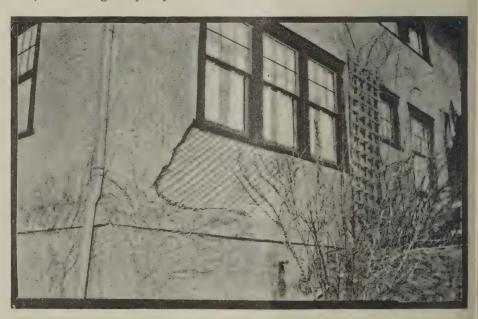
The reputation of stucco has suffered somewhat in this country because its use has only lately become general here. If a house is finished with one of the older materials-wood, for instanceand it doesn't look well, or isn't as durable as it should be, we usually know where to place the blame. We say that the designer doesn't know how to handle it artistically, or that the builder didn't do the job justice. We are, however, more severe with a new material like stucco. If it doesn't ring the bell every time we are likely to damn the material as a whole and overlook the human factor on which any good job depends.

must use plenty of elbow grease mixed with gray matter. The materials must be properly mixed in the right proportions, and be of good quality. The surfill the first requirement, the workman must have experience coupled with a desire to know something about what he is doing.

There are so many formulas for mixing stucco that one is inclined to hesitate about presenting any single one to the exclusion of the others. Almost every stucco "shark" has his own pet formula and the funny part is that they all seem to give good satisfaction, providing the workmanship is good. As a basis of argument, however, this one has given splendid results over a long period of years:

To one part cement add three parts sand; mix thoroughly while dry and then add water to make the proper consistency. Hair or fiber is usually added to this mixture to form a binder. The sand should be rather coarse. A small proportion of lime putty makes the mortar work easier and makes the stucco more waterproof. Only a small amount of mortar should be mixed at one time, as the cement will often complete its initial set within 30 minutes after water is added. Retempered cement mortar should never be used for any purpose.

There are several excellent cement plasters on the market, which are mixed ready for use. These are especially desirable, as the ingredients are more carefully proportioned than is practicable in the field.



Sills and other projections must be water-tight to prevent water from getting behind stucco, where its alternate freezing and thawing will crack the stucco loose from the lath

face which is to receive the stucco must be properly prepared.

To develop the skill necessary to ful-

Three coats are required for good stucco work. The first coat should be well pressed into the lath to form a durable key. This coat should be well scratched, and while still damp the second coat should be applied. If a sand finish is desired, the third coat is applied in the same manner that the second coat is. If a "rough cast" finish is desired, small gravel chips or pebbles are added to the last coat, which is mixed quite thin and thrown onto the second coat with a small float. A white-

are no uneven spaces of different tone.

Many interesting effects in stucco are rendered available by the use of one of the various special mixtures which are on the market. Some of these give a pure white finish. Others contain marble or granite chips and may be obtained in several colors.

The use of colored stucco in America has not reached the popularity which it

proof—furred and lathed. Here arises another argument. Some contend that the furring should be thin, say not more than ½ inch thick, so that the stucco will be forced into a tighter key when it strikes the waterproof paper. Others maintain that thick strips, ½ inches thick, are stronger. The old-fashioned way of criss-cross lathing also has many friends. With this method the laths are



The house on the right is finished with one of the readymixed stucco compounds. The finish coat is mixed with white and amber colored marble chips which give a sparkling effect where the sunlight strikes them. The trim is of wood



Small houses are well suited to stucco. The home on the left has a very rough texture and is trimmed with brick sills and stained woodwork

wash brush is useful for giving a uniform appearance to "rough cast." It is dipped into the thin mortar and brushed over the "rough cast" as it is thrown on the wall; this insures that every portion of the wall receives the last coat and there

A stucco sheathing made of 1x4 strips with a groove on the edges and down the middle. Its value is somewhat questionable as it offers very little key for the stucco. This may be rapidly turned out on a wood-working machine

enjoys in some countries abroad. Italy is especially rich in examples of what may be done in this line. Colored stucco has been used there for centuries and in many cases panels, patterns, and other decorative features have been worked out in different colors on the same wall. About all that we have attempted to do in colored stucco is to add coloring matter with an attempt to obtain an even hue over the whole surface. As our familiarity with stucco grows we will no doubt adopt the possibilities of using different colors for decorating a stucco wall surface, thus opening up new fields for the use of stucco among people who object to the somewhat monotonous effect of single-toned stucco walls.

To avoid a patchy effect the coloring matter must be carefully proportioned and thoroughly mixed. Only pure mineral colors should be used and permanent colors should be selected. Ochre is probably the most satisfactory color for stucco and a small amount added to the finish coat will enliven a wall wonderfuly. A good plasterer will always lay out his work so that his day's work will end at a break. That is, at a corner or line of windows, etc., so that the difference in color between different batches of mortar will not be so evident.

A frame wall that is to be stuccoed must be stiff so that it will not sway and crack the stucco. All roof and partition framing should be completed before the stucco is applied. On ordinary work the wall is sheathed, covered with waterproof paper—stucco is not water-

nailed directly to the sheathing, thru the waterproof paper. The laths are put on diagonally in two layers the second crossing the first. A space of about 1½ inches is left between each lath and each lath should be nailed with not less than



One of the manufactured sheathings which is made in sheets with wooden lath embedded in asphalt. These ready-to-use sheathings are becoming very popular and offer a durable and economical backing for stucco



Ready to receive the stucco. The laths are nailed to furring strips which allow room for the stucco to key

five 11/4 inch nails well drawn up.

Metal lath is unquestionably the best material for supporting stucco. Many builders object to using it because it requires more plaster than does wood lath, but it should always be used on work that pretends to be first-class. Plenty of stucco must be pressed into metal lath as it is this excess stucco which protects the metal from corrosion. Metal lath should be used around all corners and angles even if wood

lath is used elsewhere. This prevents cracks at these points. Metal corner beads are desirable on corners that may be subject to rough use.

There are now on the market several good brands of sheathing which are especially adapted to stucco. These are made of large sheets of asphalt mastic in which the laths are embedded ready to receive the stucco. These sheets are nailed directly to the studding and may be cut on the job to fit any space. This

sheathing may be erected very rapidly and if correctly applied it forms a durable and moisture proof base for stucco.

Builders should always advise clients that surface cracks do not impair the durability of stucco. These cracks are almost always present in even the very best work, but they usually extend through only the finish coat. Large coarse cracks, however, are structural and are a detriment to the durability of the work. They are often caused by settlement or shrinkage in the framework and are not always due to poor stucco.

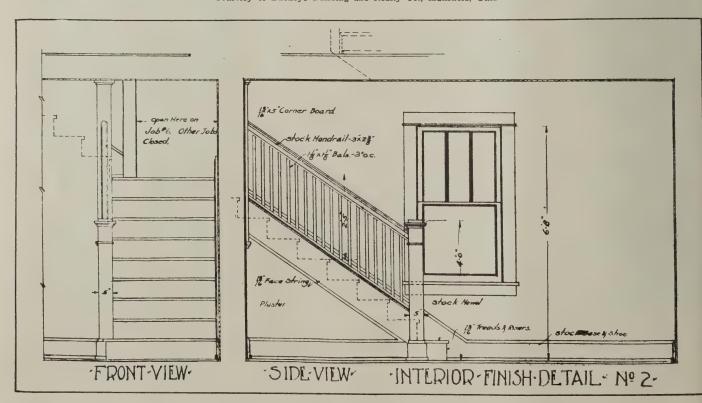
ARTISTIC CONCRETE CONSTRUCTION

The only objection ever brought to bear against concrete is that it is not particularly attractive. However, this defect is easily remedied. Enterprising paint manufacturers have recognized and met the demand for a concrete paint which serves a two-fold purpose; that is, its application makes a concrete structure not only artistic and attractive to the eye, but prevents moisture from penetrating and discoloring the surface.

It has been only recently that the desirability of painting concrete structures has been admitted. Probably that is the reason for the large number of examples of concrete construction found in all industrial centers, presenting an untidy, inartistic appearance.

STAIR DETAILS

Courtesy of Buckeye Building and Realty Co., Mansfield, Ohio



The Garage Court

THE next time that you are called on to build a private garage, spring the garage court idea on your client. Garage courts are becoming more popular every day both from the investor's and the car

the pleasure of giving his gas-fed steed the weekly rub-down.

Each garage unit is entirely independent of the others. The number of units may be enlarged or reduced to any rea-



Garage Court

owner's standpoint, and if your client's property is suitably located and he does not object to making a little money on the side, you may get a pretty good piece of work out of what promised to be a small job at the beginning.

For a district that needs space for auto storage and yet does not justify the expenditure of the considerable outlay of money required for the erection and upkeep of a public garage, the garage court offers a simple and direct solution. Garage courts are usually built on the unused portion of a lot at the rear of a residence or apartment house and they turn this otherwise wasted space into income producing property. The operation of a garage court does not require the employment of an attendant; about all there is to do is to collect the rent and fire up the boiler night and morning during cold weather.

The distinguishing feature of the garage court which appeals to the car owner is the fact that with such an arrangement each occupant has what practically amounts to his own private garage. His tools and the small, removable parts of his car, which so frequently turn up missing in the public garage, are safely under his own lock and key; he can rest assured that his car is reasonably secure from joyriders and last but not least, he is not denied

sonable extent and is limited only by the size of the lot and the condition of the pocketbook. A good size of unit to hold average sized cars is ten feet wide and eighteen or twenty feet deep, between walls, this allows room to get around the work bench at the rear. For small cars the depth can be reduced to fifteen or sixteen feet, but it is better to make the units deep enough to hold any ordinary car.

For a real court—where a row of garage units is built down each side of the lot—the clear distance across the court should be not less than eighteen feet and a few feet more is better. The sketch plans illustrate several schemes for differently located garage courts on various sizes of lots. As in any other type of building, almost every job requires a different solution, but the sketches illustrate practical layouts that offer suggestions that may be employed in the solution of any particular problem.

General Construction

Any of the ordinary building materials may be used in the construction of a garage court, but they are usually built semi-fireproof, with 8-inch exterior walls of brick, tile, or concrete. The partitions may often be economically built of 4-inch gypsum partition tile. These tile are 12x30 inches on the face, are light in weight and lay up rapidly. Gypsum tiles are fireproof, but in a large garage court it is desirable to have an eight-inch brick fire wall between every six or eight garage units. This fire wall should extend at least eighteen inches above the roof.

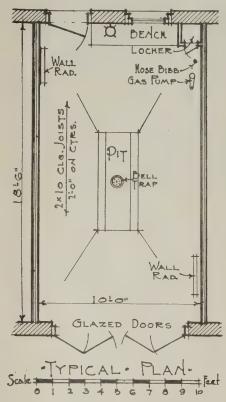
The floors should be of concrete. The open court may be either paved with concrete or merely surfaced with gravel. Concrete is of course to be preferred and if used it is laid sidewalk fashion, usually on a bed of cinders and is divided up into blocks about ten feet square with mastic filler in the joints to allow for expansion.

For the garage court to be wholly fireproof, the roof as well as the walls and floor, should be built entirely of fire-



Entrance to Garage Court

proof materials. Either a concrete slab or one of the systems of concrete joists with tile fillers are suitable for this purpose. The latter types are light and require very little form-work for their



A plan for a typical garage unit. It offers every advantage given by a private garage. If desired only a portion of the units might be equipped with gasoline pumps and storage tanks, and an increased rental asked for these.

erection. These roofs may be covered with prepared roofing to make them fully watertight.

If the roof is framed with wooden rafters, the roofing should be of fire-resisting materials to prevent the spread of fire from outside sources. Metal, or some of the prepared roofings that are practically incombustible are suitable.

Lighting

The garage units should be well lighted so that the car owner can see to make repairs. This is best accomplished by means of glazed panels in the upper portions of the front doors and by windows in the rear walls.

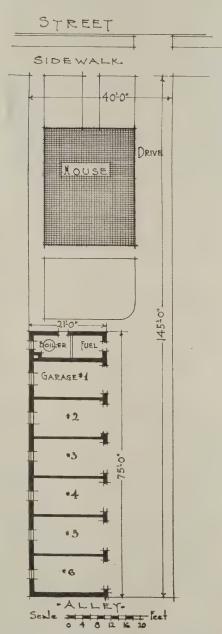
Electric lighting should always be provided when it is possible to obtain it. It is the safest light that can be used around a garage. One outlet is sufficient, and it should be placed at the rear, near the work bench, instead of in the usual location in the center of the ceiling. A light in the center of the ceiling is inconvenient in more ways than one and they are often damaged when the top is up. A two-way cluster socket screwed into the outlet will provide a stationary

light at the bench, and an extension cord with a trouble lamp may also be used at the same time.

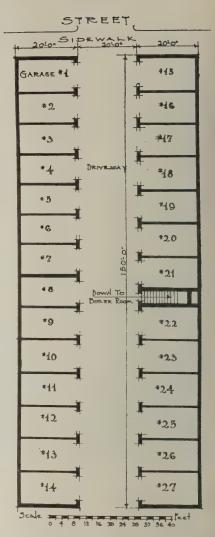
Heating

In cold climates it will usually be necessary to furnish heat to keep the temperature of the garage below freezing. Private garages are sometimes built without a heating system, but very few car owners will rent garage space if there is no protection from frozen cylinders and radiators.

The heating plant may be an inexpensive system of the stream or hot water type, with only enough radiation to keep the temperature above freezing during the coldest weather. Any greater amount of radiation is probably super-



No. 1—This plan is suitable for a comparatively narrow lot. In a scheme of this sort the entrance from the street is often omitted, the only entrance being from the alley in the rear of the lot.



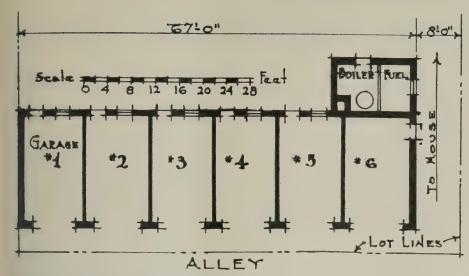
No. 2—A plan for a lot of 150 feet deep by sixty feet wide. Where the units are built with the rear wall on the property line, it will usually be necessary to use small skylights to obtain light.

fluous, as any one remaining in the garage for any length of time will likely be working on the car and will create enough body heat to keep comfortable.

The heating plant for a large garage court should be located in a basement so that there will be plenty of room for the plant and for coal storage. With such an installation ordinary floor radiators may be used. The plant for a small garage court may be located above ground, using wall or ceiling coils to permit the returns proper drainage back to the boiler. The coal room and the boiler room should be entirely fireproof even though the garage itself is of wood construction.

Paint

Paint for doors or other wood work should preferably be of a fire-resistive nature. The inside walls and ceiling should be whitewashed. This adds materially to the appearance of the garage, and also makes the interior much lighter. If the partitions are built of gypsum tile it will not be necessary to whitewash



No. 3—This plan is suitable for the rear portion of a wide lot. In some cases it is possible to furnish heat from the house boiler by running an underground main from it to the garage

them as this tile is naturally white in color and will probably remain so indefinitely.

Equipment

To attract renters, the garage units should be equipped with every practical convenience that car owners would require in a garage of their own.

There should be a work bench near the rear of each garage unit so that the car "fan" may scrape and file away to his hearts content. There should also be a small locker near the bench, for storing tools, overalls, lap-robes, etc.

At least every other garage unit should have a concrete pit formed in the floor so that it will be easy to get under the car to make repairs. It is hardly neces-

sary to have a pit in each garage unit, as some car owners do not care for them. The pit should have a floor drain connected to the sewer and should also have an iron grating or a wood cover over the top.

'In many cases it will be desirable to have a private gasoline pump and tank for each garage unit, but sometimes only one large tank with a measuring pump is provided and the car owners are supplied with gasoline above the wholesale rate, just as in a public garage.

The hardware should be of good substantial quality with strong locks. The doors may be of the hinged type or equipped with garage door hangers so that they will slide back flat against the inside wall. The latter type are space

savers well adapted to the close quarters usually found in the garage court.

Cost

A well built semi-fireproof garage court having six or more units should be built for three hundred dollars per unit, not including individual gasoline storage tanks and pumps. Each unit should rent for from \$10 per month upwards.



A Tenant

Assuming that a portion of the lot is already occupied by a building and that the remaining portion has no other income producing value, the total expenses of each garage unit built on the premises should not exceed twenty or twenty-five dollars per year, including taxes, depreciation on building, fuel, water and light.

In other words, the interest on the investment should amount to not less than twenty-five to thirty per cent per year. Of course, if the garage court is built on vacant property where the value of the land must be figured, the scheme becomes less attractive from an investment standpoint, unless more income can be obtained from the rentals.

Order Record and Check of Quotations Against Invoices

A combination record of orders for material, where used, and quotations obtained is used with success by the Capital Construction Company, Madison, Wis., and is here reproduced. The original size of the record is 634 by 4½ inches. More or less frequently when the invoice for material comes in the figures are higher or not the same as the quotations given when the material was ordered. The record makes adjustments easy, as all the facts are obtained at the time of the transaction and written down.

Remember that quotations hold good only for a specified time. When you get quotations over the phone get the time limit and get action within the time. ORDER SLIP—Capital Construction Company

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Be Sure to Get Prices-It Saves Time and Money

The Two-Story Bungalow Type

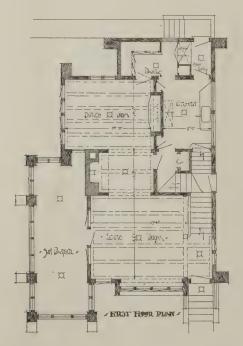
PROBABLY the most interesting feature of the design of the bungalow type of house lies in its possibilities for variation. Of course, all builders understand that a real bungalow is a one-story affair, but the bungalow type may also include houses in which two stories are



No. 1—This is the largest house in the group. It is located on a corner lot and is designed to make a good appearance from all sides. The rooms are generously large and the fireplace nook between the living and dining rooms is out of the ordinary.

frankly expressed. This fact has given use to still greater possibilities in the way of adapting the bungalow type to American needs.

In towns where land is comparatively cheap the true bungalow is often in demand, but for expensive lots the two-story house is preferred, although the client often wants his two-story house to look like a bungalow insofar as its architectural appearance and detail are con-

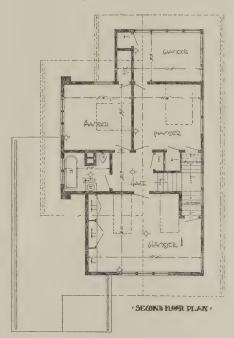


cerned. This very requirement has been a source of much bad design. Designers usually have a very limited stock of two-

story bungalow types to draw from, and very frequently the two-story house of this type becomes a sort of cross between a bungalow and an unrestrained imagination.

This does not mean that imagination isn't a powerful aid to design, but it must be held down. This thing of sitting down and working up a design "out of my head" is a fruitful source of much poor work. We need some sort of a safety valve on our imagination. The best safety valve is a good plan which has been worked out along lines similar to those which we have in mind. Then we get a better idea of what our house will look like. We can judge distances more accurately and can check up our design as we go along.

The man with a lively imagination need not fear that using plans in this manner will make a mere copyist out of him. The requirements of his problem



will always make changes necessary and his imagination will evolve different ways of expressing his ideas, so that his completed design will usually have no apparent similarity to the one which he employed as a guide.

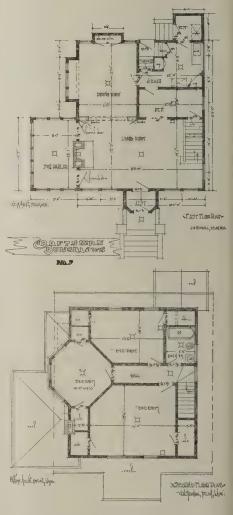
The accompanying illustrations are full of clever ideas for the two-story bungalow type of house. They have the bungalow flavor without resorting to a lot of petty detail. The designs are restrained, but are not dry. The plans are usually novel and compact.

These houses were designed by F. A. Kemp, architect, and were built for Mr. J. W. Menhall at Beloit, Wisconsin. There are some eighteen houses in the group, and although they were built to

sell, they differ from the ordinary real estate development in that almost every house is different from its neighbors. This difference includes not only the exterior appearance, but usually the plans as well. The lots are of ample size and the streets have been laid out with easy



No. 2—The projecting vestibule has much practical value in cold climates. The octagonal bed room on the second floor is ingeniously worked out... Note that the first floor, facing the street, is almost all windows.



curves so that every house shows up to its best advantage.

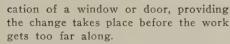
It will be noticed that some of the plans show slight variations from the ap-

pearance of the houses in the photographs. These slight changes were made to meet the individual requirements of the buyers and do not work any harm.



No. 3—This plan is quite similar to Number 2, but the entrance is toward one side of the living room and it has no vestibule. Also the sun parlor is longer. Such large-sized living rooms are unusual in small houses.

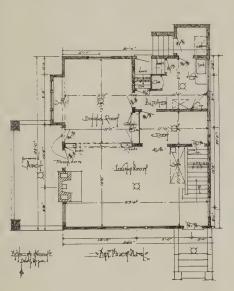
· THEN TOOL PLANT!

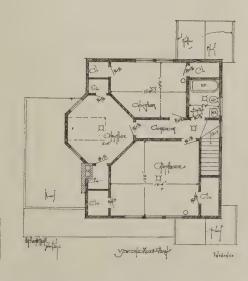


The plans and photographs explain themselves and there is no need to enter



No. 4—This plan is similar to those of Numbers 2 and 3, but the exterior is sufficiently varied to avoid monotony.





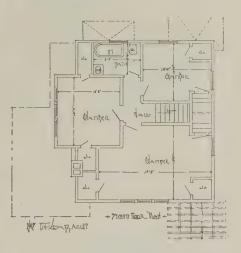
It is usually advisable to make slight changes of this kind in order to have a satisfied customer. Even though type forms of houses are being built, it doesn't cost anything to change the lo-

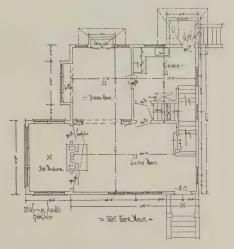
STECRETO TOOK PLAN!

into lengthy descriptions of their merits. It will be advisable, however, for anyone who contemplates building a two-story house along bungalow lines, to study them carefully.



No. 5—Here the stair is so arranged that it takes very little space from the living room. Note that it is a combination stair accessible from the kitchen. The large front bed room would appeal to many buyers.







No. 6—A real bungalow with stained shingle walls, white trim, and an open terrace instead of a porch. The detail in the peak of the gable is interesting and well handled.

No. 7—Trelliswork plays a large part in making these houses attractive. The one just behind the tree has not been set in place.



No. 8—A large porch across the front is still in demand, although they are being rapidly replaced by the more practical sun porch. Note that the porch is of brick, while the main body of the house is of wood.



No. 9—This one has brick for the first story and shingles for the second. This combination is almost always good looking. Here the open porch is at the side and can easily be made into a sun porch.



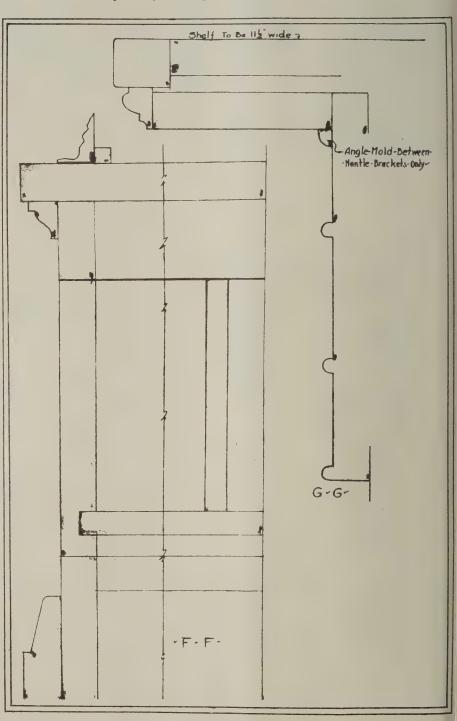
No. 10—Another one with a projecting entrance to form a vestibule. The pergola-like treatment and the lift dormer help to give this house the bungalowish look.

DERRICKS

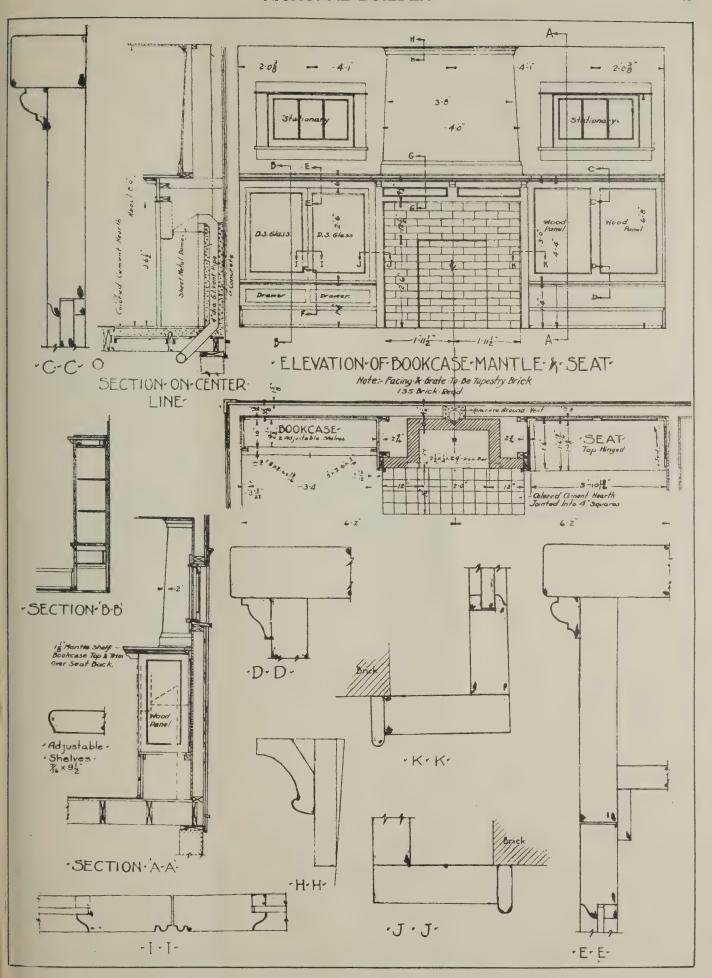
A small derrick should be present on every job where there is any stone or steel to set. Some of them are of wood to stand on the ground and others are of iron and steel, to rest on the roof and raise loads up over the wall.

Interior Details—Bookcase, Mantle and Seat

Courtesy Buckeye Building and Realty Co., Mansfield, Ohio



In these details and similar details appearing in National Builder from time to time the practical builder will find many helpful suggestions which he can use direct or modify to suit his purposes. What effort are you making to include in your plans definite provision for refrigerators, auxiliary hot water heaters, dumb waiters, clothes chutes, etc.? These conveniences will be in increasing demand



Planning the Kitchen

THE old type of kitchen differed from the other rooms of the house in that it sometimes contained a sink stuck off in one corner. It was usually a little darker and not so well ventilated as were the other rooms, but these were the only apparent differences.

The new type of kitchen receives more attention from the careful designer than do all the other rooms put together. It is the most important room in the house. If the kitchen is a failure, the whole house is indirectly condemned by the mistress. "Yes, the living room is beautiful and the exterior is a dream, but, my dear, you should count the steps that I make in that kitchen!" A woman will usually stand up for every other portion of her house, but she seldom hesitates to express on honest opinion about the kitchen.

If you've ever built one that wasn't satisfactory to the housekeeper, you can probably trace the loss of a number of other good jobs to that very fact. If you've never built an unsatisfactory kitchen, it is no doubt due to the fact that you have anticipated some of the following suggestions and have profited by them.

In planning any kitchen, the first thing to be done is to obtain the woman's point of view. It is to be her workshop, and it is not to be expected that a builder can successfully arrange so complicated a layout unless he consults with the person who is to use it.

Location

A kitchen should always have at least two outside walls suitable for windows. A kitchen sandwiched in between other rooms so that light and ventilation can be had from only one wall, implies a lack of skill on the designer's part. Kitchens are sometimes placed so that they receive nothing but north light and consequently never a ray of sunshine. This is bad from a sanitary standpoint and nothing more gloomy can be imagined. A builder who deliberately locates a kitchen in such a position is worthy of all the abuse that a good housekeeper will surely shower upon him.

A kitchen should be placed on the northeast corner of a building, if such a location is practicable. A west exposure is bad during the canning season and is especially undesirable for those households where the preparation of the heaviest meal comes at the end of the day when the hot afternoon sun of summer is beating into the kitchen. If the kitchen is built as an extension from the house it should be located against the east wall of the house, and have windows in the north and south walls. This

gives real cross ventilation and is ideal for comfort, Fig. 1.

A farm kitchen is usually placed so that an extended view of the highway and if possible, a view toward the fields is provided. This will usually mean a kitchen at the front of the house. Many town houses too, now have the kitchen at the front. Such an arrangement often makes a plan work out well and is especially good for the farm, where life at its best is somewhat lonely and even a passing vehicle is often a cheerful sight.

fer to cook and eat in one room, a large kitchen will be required. In such a room it is a mistake to scatter the kitchen equipment all around the walls, with the dining space in the middle of the room. To avoid unnecessary walking and confusion the equipment should be bunched together. The dining table should be arranged so that it will not be necessary to walk around it while preparing meals.

A combination kitchen and dining room is not practicable for a farm when the feeding of large numbers of men during harvest season is considered. In



A modern kitchen in the Y. W. C. A. cafeteria at Madison, Wisconsin. It is equipped with electric ranges, ovens and steam table. The walls are of white glazed brick

The front door should always be placed so that it may be easily accessible from the kitchen.

Finally and most important of all, the kitchen should not be placed so that it must serve as a common thoroughfare between other rooms in the house.

Size

For the average family, a kitchen about 10x12 feet will give good satisfaction. For the country and localities where fuel gas is not available and an ordinary range must be used, it should be larger. A coal or wood burning range heats up a kitchen considerably more than a gas range does.

A kitchen that is longer than it is wide will make for a more convenient arrangement.

If the family is one of those that pre-

such a case the general plan should be arranged so that one or more temporary tables, located in the living room or on the porch, may be easily served from the kitchen

Dining alcoves are growing in popularity for use in both town and farm kitchens. They will be discussed in detail later.

The Back Door

An outside kitchen door should be at least 2 feet and 10 inches wide so that bulky articles will easily pass through. They should never be less than 1¾-inch thick, 2¼ inches is better, and they should be hung with three hinges. The kitchen door receives more abuse than any other door in the house.

The upper panels should usually be glazed to increase the light, and to per-

mit the identification of back door callers before the door is opened. Many thieves and other undesirables gain access to homes by knocking at the back door and pushing their way inside if the door is opened by a woman or child.

In cold climates it is advisable to have some sort of vestibule or wind break at the door between the kitchen and the outside. A storm vestibule that may be removed in summer is practicable. Fig. room for the hired hands. Very often this room is really a glazed porch with sash all around the kitchen walls. Cellar sash set close to the ceiling and hinged at the bottom to open in, makes a practical treatment. There is a door from the wash-room to the kitchen, and what is equally as important, another door is provided so that it is not necessary for the men to pass through the kitchen to reach other portions of the house.



A kitchen for a small family. It is well arranged to save unnecessary steps. The actual arrangement of any kitchen should be left to the housekeepers

2. A grade line entrance as in Fig. 3 forms a permanent wind-break. The arrangement shown in Fig. 4 is also used. The enclosed portion of the porch in the latter scheme makes a fine place for a refrigerator of the type that does not have the outside icing feature.

Fig. 5 is a modified form of Fig. 4. With this scheme ventilation is obtained by leaving the kitchen door open in summer, the door at the bottom of the steps being replaced by a screen door.

Fig. 6 suggests an arrangement for a farm house. This scheme is merely an elaboration of Fig. 3. It is a grade line entrance opening directly into a wash

In town houses the wash room could be used as a laundry or merely as a kitchen porch. In the later case the seat could well be retained and provided with a hinged top so that it could be used as a storage space for several day's supply of vegetables. This supply being replenished from the cellar as needed, thus saving many daily trips to the basement. If this porch is heated the sink can also be retained and the porch used the year around for preparing vegetables for cooking, thus largely doing away with one source of kitchen dirt.

Windows

Windows should be placed on at least

two sides of the kitchen and as far apart as practicable so that the maximum amount of light and ventilation may be afforded. See Fig. 1. Windows facing each other on opposite walls are ideal, but this is seldom possible.

In general, the kitchen windows should be set with the sills 4 feet above the floor. This will make the heads come close to the ceiling and will afford better light and ventilation. There are cases, however, when it will be necessary to have one window set low to light a dark corner. The wall spaces under high windows may be utilized for sinks, tables, etc. The windows should be placed so that there will be good light at the sink, work-table, and range.

Casement windows should always open outward. This means that the fly-screen is on the inside. If the window is equipped with ordinary hardware the screen must be opened before the window can be opened or closed. This is unsatisfactory. The best way to operate a casement window is by means of a special casement adjuster. These permit the window to be opened or closed without touching the screen. A good adjuster will also prevent a window from slamming shut even during a high gale.

Casement windows opening into the kitchen are troublesome. They are in the way and it is always difficult to make one watertight.

Walls

Plain plaster is most commonly used for kitchen walls. It is largely a matter of personal opinion as to what finish should be used for the plaster. A sand finish looks best and, although it cannot be washed, it can be retinted once a year at slight expense. Hard finish, painted plaster makes a good wall that can be washed down once a year and can go for several years without repainting.

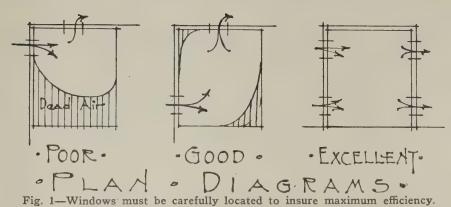
A smooth hard troweled wainscot 6 feet high, with sand finish upper walls and ceiling offers a practicable compromise. The wainscot should not be scored to represent tile, as the grooves are hard to clean. Hard plaster work requires considerable skill on the part of the workman to insure a good job.

There are now several good oilcloth wall papers on the market. These are washable and are considered excellent for kitchens. The gloss finish is recommended.

Tiles or enameled bricks are used for high grade work, hotel kitchens and the like. They are considered the best possible materials for kitchen walls, but are quite expensive. They are stainproof, non-absorbent and are easily cleaned.

Moldings and Trim

Kitchen wood work receives hard wear and it must be of the plainest character, with few corners that will collect dust.



The round edged trim—Fig. 7 is good, and the narrow width—3½ inches—is preferred. The base-board should be about 5 or 6 inches high. Fig. 7 also shows an improved type of quarter-round at the floor. A cove mold at the floor is better than a quarter-round as it forms no corners. Ordinary hollow-round molds may be brought to the shape shown in Fig. 7 by rounding the edge with a hand plane.

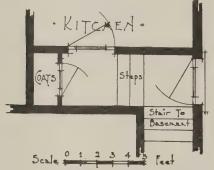


Fig. 3—A coat closet near the back door is a convenience that is appreciated by women

Tile jambs, casings, etc., are ideal, but they are too expensive for any excepting the very highest grade work.

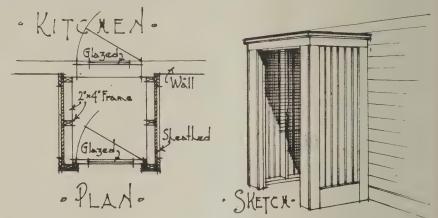
Floors

Pine may be used for floors that are to be covered with linoleum. Under such conditions it is just as good as more expensive hardwood. The workmanship of floors that are to be covered with linoleum must not be slighted. They must be carefully laid, and smoothed so that there will be no uneven places to wear thin places in the linoleum.

Maple and edge-grained pine cost but slightly more than ordinary pine and may be used without linoleum.

Linoleum makes a splendid floor surface. A good job is carefully fitted and all joints and edges are cemented to the floor. A coat of floor varnish improves its durability.

Composition floors are composed of asphalt mastic combined with other ingredients according to manufacturers' formulas. They require special skill in laying and are not economical for ordinary residences.



ioints.

Fig. 2—This storm-vestibule may be made in three pieces—tops and two sides—so that it may be more conveniently stored away in summer

Rock asphalt mastic makes a splendid floor surface, but it is dark in color. Most housekeepers consider it too unsightly for use as a floor covering for their kitchen. It is often used in hotel kitchens, etc. This material offers a tough, durable surface that is free from joints. It is waterproof and comfortable to stand on.

Both cement and tile are tiresome on the feet. The former absorbs grease and dirt, and the latter is dangerously slippery after it becomes worn and water is spilled upon it.

Finish for Woodwork

First class kitchen woodwork should

ish may be obtained by using two coats of paint and only one coat of enamel. This finish, of course, is not so durable as five-coat work, but it looks almost as well if the wood has only a slight grain that is easily covered.

be primed on the back before it is set up. If well done this will form an effectual seal against the steamy air and will prevent decay and the opening of

The most durable finish for kitchen woodwork is enamel, but it is expensive and requires constant steaming to keep it looking fresh. The best enamel finish consists of two coats of special white

paint followed by four or five coats of first class enamel. This finish becomes

very hard, and if properly applied it will wear indefinitely. A cheaper enamel fin-

A stained and waxed finish is cheaper than enamel in first cost and is satisfactory for ordinary work. Varnish is also used, but its appearance is not so good as that of the stain.

Paint is cheapest of all but it soon becomes shabby on account of the constant scouring and cleaning that kitchen woodwork requires.

For kitchen floors that are to remain bare, a tough waterproof floor varnish,

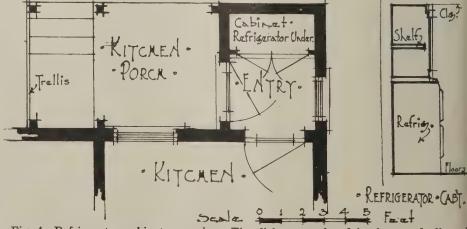


Fig. 4—Refrigerator cabinets save ice. The dishes are placed in them and allowed to cool before being placed in the refrigerator

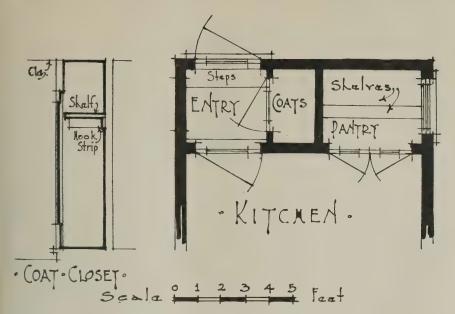


Fig. 5—The coat closet might be omitted and the space used for a refrigerator.

that does not scratch white nor chip, should be used. Nail holes should be carefully putty-stopped with putty colored to match the wood. Liquid fillers, shellac, or any other so-called firstcoaters should never be used as an undercoat for varnished floors. Ordinary shellac contains an excess of water that may be turned into steam by the action of heat, thus raising unsightly blisters in the best of varnish. Before applying varnish see that the floor surface is entirely free from grease, dust, and moisture. Most woods used for kitchen floors are "close grained" and require no filler.

If a stained floor finish is desired, apply stain to the bare wood. Allow the stain to become thoroughly dry and then apply two or three coats of varnish (according to grade of work). Allow at least 24 hours between each coat of varnish and rub between coats with curled hair or moss. The final coat may be left glossy or may—after 48 hours—be rubbed to an egg shell gloss. The latter is preferred for kitchen floors.

If the floor is to be finished "natural," omit the stain and proceed as above.

Painted floors are not durable and require frequent patching of worn places in the surface.

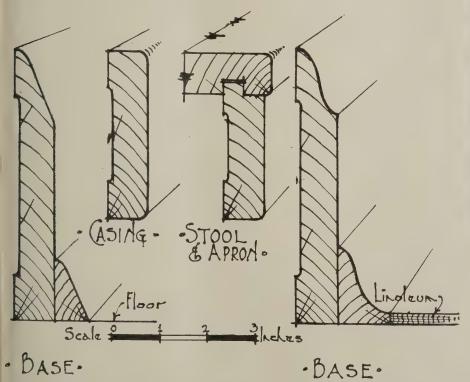


Fig. 7—Don't use "fussy" trim in the kitchen if you want to keep on the good side of the housekeeper

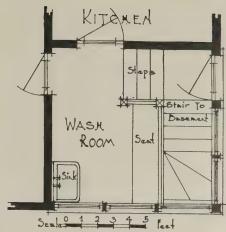


Fig. 6—Some women would prefer to have laundry tubs instead of the seat. Many laundries are now placed on the first floor instead of in the basement

VARIETY IN FINISHING WOOD-WORK

Variety in the appearance of woodwork may often be gained by a treatment similar to the one illustrated in the accompanying photograph.

This shows a cased opening between a living room and a dining room. The woodwork is of birch. The recessed panel is stained with mahogany stain,



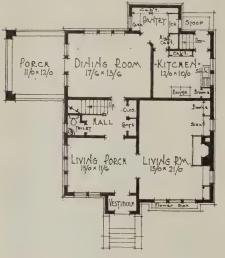
while the remainder of the woodwork is finished with white enamel.

This sort of treatment is often suitable for other details besides paneling. It is often used effectively in Colonial work, notably in mantels and stairs. The mantel shelf is stained mahogany color and the remainder of the mantel enameled white. In stairs, the heads and handrail may be finished with dark stain, mahogany or walnut, and the remaining woodwork finished with white or ivory enamel-

A Pleasing Design

ONE of the chief difficulties in the design of two-story stucco houses is to make them appear lower than they really are. The frame house does not offer such a difficult problem in this regard, as the horizontal lines of the siding or shingle tend to give a feeling of width rather than height. Brick or stone houses are a little harder than frame ones, but the comparatively small size of the units which form the walls helps to break up the surface, and as the horizontal joints are continuous while the vertical ones are broken, the appearance of height is lessened.

The accompanying illustrations show a house designed and built by Oscar Sandstrom for John Faubel, of Waukegan, Illinois. Although the first floor of this



house is more than three feet above grade and the ceilings are quite high, the house does not appear stilted. The wall construction is of stucco on wood frame.

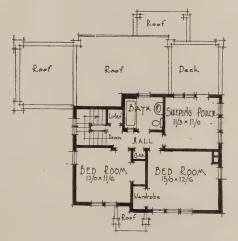
One of the principal reasons for its good lines is due to the high base course which encircles the walls just at the window sills. This base course gives a break in the surface and causes the eye to hesitate before passing beyond it. This momentary hesitation is sufficient to mislead the eye and the effect of the real height is lost. Wide projecting roofs at the gables are not often pleasing, but in a case of this kind they do help to give a low appearance to the building and are excusable on that account.

The entrance to this house is well handled and suited to the materials of which it is made. The flower box which is built into the base course under the large living room window, is also good. The brick chimney would look better if it were stuccoed. The sash muntins would also be better and perhaps cheaper



if they were of the ordinary type, breaking the sash into uniform rectangles.

In the first floor plan, the location of the stair is somewhat out of the ordinary and seems to work out well. The entrance through the living porch has advantages. The way from the kitchen to the front of the house seems rather roundabout, but with such a large dining room, it is probably as well as can be done. The porch off the dining room can be used as a dining porch in warm



weather. The toilet under the stair is a practical convenience.

The second floor plan is unusual from the fact that it covers only a little over one-half the area of the first floor. There are but two bed rooms, but the sleeping porch is the equivalent of another. The built-in wardrobes in the bed rooms are much better than corresponding closets would be. This floor is compact and well arranged and the bath room is easily accessible from all of the rooms.

BUILDING CODES

What do you know about your local building code? Of course you know that there are different rules for different buildings, but do you know the actual requirements for the different classes?

A building commissioner in a large city recently said: "About 15 sets of plans for remodeling buildings come into this office every day. Out of this lot I can seldom O. K. even one set of blueprints, because the proposed alterations will usually change the classification of the building."

A clear knowledge of the building code will keep you from wasting time and money. To solve a building problem only to find out that you have a scheme that is not practical because it is not in accordance with the law, is discouraging, to say the least.

Another thing, if you are familiar with the code you may see ways to reduce the cost of a building by application of the law. For instance, a plan calls for a certain type of construction, while the code permits the use of a cheaper one. If the architect's attention is called to this fact he will often allow the cheaper method to be substituted.

A National Code

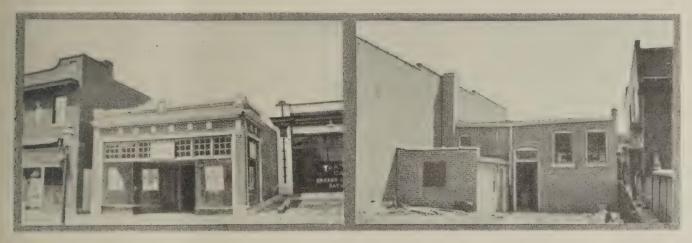
The United States Bureau of Standards is the only body now in existence which has the power to dictate a standard code having any authority behind it and without selfish interest.

Much surprise has been expressed that the codes worked out for government war housing by the committee appointed by the Department of Labor were not selected from the National Board of Fire Underwriters Code.

A Small Store Building

THE store building illustrated on this page is an example of the modern tendency to devote more study toward making an attractive design even though the means are limited.

and are selected by the manufacturers as stock designs because of their attractiveness. Stock designs may be obtained much quicker than special designs, as at least six weeks must be allowed for modmortar joints to harmonize with the terra-cotta trimmings. The display windows are set in metals bars and are designed to give the maximum space for display purposes. The transom lights are of



The day of the frame store building with its false front sticking into the air to hide the gable roof behind is gone. Business buildings, even in cross-roads towns, now usually have a substantial air. Brick, stone, cement and hollow tile are now easily available in almost every locality. The modern business man knows that the use of these materials in a building gives an air of permanency to his business and that his trade will suffer if he attempts to sell goods in an out-of-date building.

Nowadays we are all more or less cranks on the subject of sanitation. No matter whether a man deals in groceries or in wheelbarrows, we expect his place of business to be clean and attractive. If it isn't; well, it's only a few steps around the corner to a place that is! A woman will walk blocks out of her way to trade in an up-to-the-minute store, and she's willing to pay for it, too.

One of the simplest and most effective means of obtaining a crisp, clean effect in the appearance of a store front is by using terra-cotta trimmings. Ornamental terra cotta may be had in various colors and textures, but the white matt-glazed finish is most popular. Good terra-cotta is more durable than brick and is impervious to the action of the weather. When it becomes dirty its freshness can be restored simply by washing with soap and water, just as tables dishes are cleaned. In fact, the process of manufacture is very similar to the making of crockery ware.

Terra-cotta manufacturers now carry stock designs in a variety of patterns. These patterns are designed by leading architects and designers for special work eling and burning the latter. Stock designs are also considerably cheaper than special ones.

The building illustrated is built of cherry-red brick laid up with wide white



prismatic glass tiles to deflect the light to the rear of the room.

One prominent feature of the construction is the absence of a basement. This of course saves considerable excavation and foundation work. By building a small room at the rear, a space for the heating plant is provided. The floor of this room is lower than that of the store so that the returns will drain back to the boiler.

This building is being built by Harry Horowitz, a builder of St. Louis, Mo.

THE CONCRETE FLOOR

Concrete is largely used as a floor material for garages, factories and mills, and gives a surface easily cleaned and impervious to water.

There is, however, one serious objection to this type of floor. When the floor is subjected to wear, there is a tendency toward the "dusting off" of the cement particles, and these particles floating about in the air are injurious to the health of employes and a menace to the working parts of delicate machinery.

The use of a proper protective coating, however, will readily overcome this objection. First see that the floor is perfectly dry and then apply a brush coat of concrete floor first coater. This will seal up the pores and stop the suction. Allow this coating to dry twenty-four hours and follow with two brush coats of concrete floor paint, allowing forty-eight hours for drying between coats.

If the floor is subjected to unusual wear, a final coat of good floor varnish will add materially to the appearance and durability.

Reducing the Overhead Expenses

By Ralph R. Windoes

KEEPING busy in the shop in off seasons and on bad weather days helps to reduce overhead expenses and gives the hands something to do. The builder cannot afford to lay off his men at too frequent intervals in these times. There are a great number of things that can be made and marketed locally without much difficulty, and the builder can count to a large degree on local pride in his customers wanting articles made in



their own town by a man they know. There is a strong feeling in favor of an article "specially made" that the builder can count on and make a good talking

We submit two designs this month that have possibilities of easy sale. The first of these is

A Foot and Leg Rest

The argument for this is that it saves the chairs and other furniture from the wear and injury inflicted by the average man who does not feel he is resting until he can get his legs higher than his hips. The foot and leg rest not only saves friction on the furniture but domestic friction as well.

It is simple in construction and takes but little time to make. The stock list calls for:

- 2 pieces 1x10x21 inches, ends.
- 1 piece, 7/8x91/2x18 inches, seat.
- 2 pieces, 11/8x2x18 inches, braces.

Form the ends as shown in the work ing drawing, and screw them to the seat and braces. Use 21/2-inch 10's, flat head, well countersunk, and cover the heads with wooden buttons. These buttons can be purchased from dealers in upholstery materials, or they can be turned up by hand. If neither of these methods of

securing them are available, square buttons can be planed and glued on in their stead. Dowel pins can be used in place of the screws, but they would not make as substantial a piece of furniture.

Before applying the finish, be very sure that you have a good clean job on the wood. Don't leave any saw marks, or hills and hollows left by the planer. Have the stock sanded.

Finish the piece as you desire-directions have been given many times in these columns-and apply the upholster-

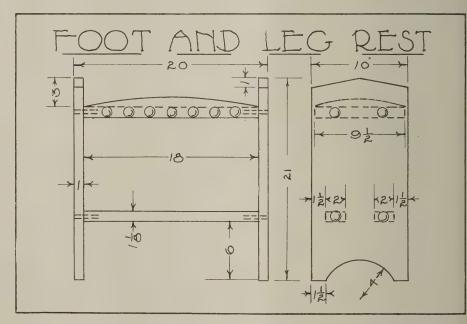
Genuine grain leather is recommended, although the heavy grades of imitation of leather will look and wear well. To upholster, heap a quantity of curled hair on the seat, and tack a piece of heavy cloth over it, drawing it down tight. As you tack, work the hair so that it leaves no hollows or high places, and make it quite a bit higher in the center than along the edges. When this has been placed in good shape, place the leather

is set down so that the top of the pot is just a little higher than the cross rails, allowing the fern to grow out and over the edge of the stand.

Stock needed for this design, all pieces planed and sanded to exact dimension requires

- 4 pcs. 13/4x13/4x30 inches, legs.
- 8 pcs. 7/8 x2 x13 inches, rails. 12 pcs. 3/8 x4 x 7 inches, slats.
- %x12 x12 inches, bottom.

Shape the legs as shown in the working drawing, and cut the mortises in them. Cut corresponding tenons on the rail ends, and rout out grooves 3/8-inch wide for the slats. The design in the sides of the slats should be laid out on paper and transferred to each separately, after which each one can be cut and smoothed. When gluing up the stand, place the slats before clamping the rails in place. The bottom can be fastened to the rails by screwing in at an angle from the under side, or using small angle



and tack it along the edges. Where it comes flush with the ends, turn the edges of the leather in. Cover the tack heads with gimp braid and upholstery tacks, leather face.

A Jardiniere Stand

A jardiniere stand is a desirable bit of furniture. The ferns or flowers can be moved to the sunlight and placed where they make the most effective decoration. The design shown is of the type in which the pot holding the fern

Clean off all glue that may be visible on the outside and scrape and sand thoroughly before applying the finish. A good finish for a piece of this kind which will be subject to more or less moisture is made as follows:

- 1. Sponge lightly with water, and when this has dried, rub down with fine sandpaper.
- 2. Apply a coat of good oil stain of the desired color, and allow it to stand
 - 3. Apply a coat of thin shellac. This

prepared shellac can be thinned with wood or denatured alcohol.

4. When dry, sand lightly and apply a coat of paste wood filler of about the same shade as the stain. The natural filler can be thinned with some of the stain used in the first place, while colored filler can be thinned with benzine

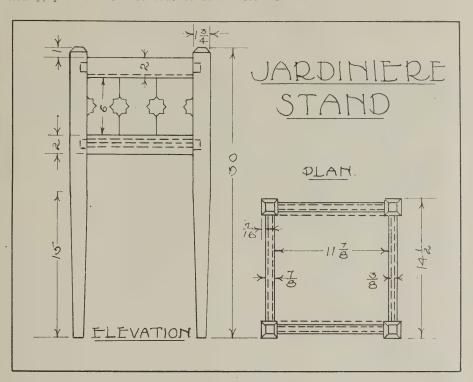


or turpentine. When used, it should be of the same consistency as thick cream. Apply it and allow it to stand until dull, then rub off clean.

- 5. The next day, apply a coat of shellac, but do not thin this coat. When dry, sand down lightly.
- 6. When the dust has settled sufficiently, put on the first coat of some

high grade water spar varnish for interior use. Let it stand two or three days, then rub it down with pumice stone and water.

7. Apply the second coat of the same varnish, and in about four days, rub it down with rotten stone and oil. This should give a very attractive and serviceable finish.



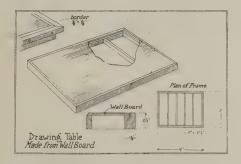
Drawing-Table Made From Wall-Board

Drawing-tables of any considerable size are, as is well known, quite expensive, because to be good they must be made of many strips of selected wood carefully jointed together. They are also very heavy and therefore cumbersome, and for these several reasons usually unfit for the practical builder who has to do drafting at times and yet not sufficient to warrant a complete architect's equipment.

A drawing-table made of wall-board, as shown in the illustration, costs perhaps one-fourth of the price of a wooden one and weighs less than one-half as much for the same size. It is durable, is not subject to warping and buckling and gives excellent service.

A practical plan for making such a table is as follows: Take some 1\%-inch surfaced stock anywhere from 2\frac{1}{2}-inch to 4\frac{1}{2}-inch, in width, depending on the

size of the table, and on one edge form a rabbet ¼-inch wide by the thickness of the wall-board deep, which is usually 3/16 or ¼ inch. Make a frame of the required size, mitering the edges to-



gether. Now make some ribs of ¾-inch stock and of a width corresponding to the width of the frame stock on the inner or rabbeted side, and fasten them in place, 9 inches apart on centers. Cut a

piece of wall-board of the required size, joint the edges, and fasten it in the frame with glue and brads.

The wall-board used should be one of the tough and hard-surfaced kind, and it must on no account be "sprung" in, but should, instead, rather be made a trifle smaller than the size of the rabbeted area, say a small sixteenth all round. This will take care of any possible expansion that might take place.

A drawing-board so made will be found highly satisfactory. The hard, smooth surface of the wall-board is excellent for working, while the wooden border gives as good a working edge for the square as the most expensive wooden board.

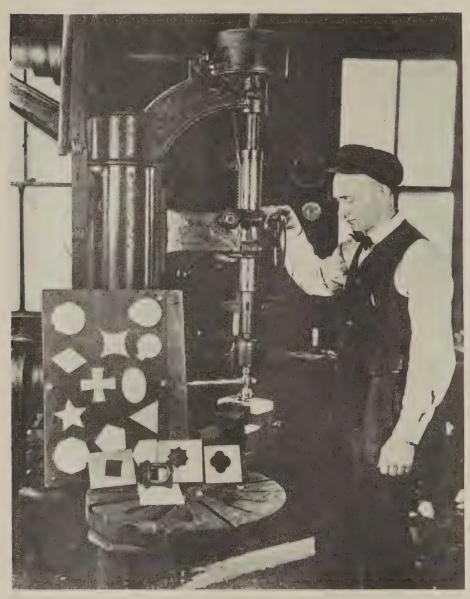
If a thin border is desired, this can be easily added by screwing a %-inch by %-inch strip along the top edge of the frame, as shown in the detail.

Boring a Hole of Any Shape in Wood, Stone, or Metal

Schmidgall, of Peoria, Ill., is not limited to use in wood, but can be fitted with cutters for drilling holes in steel

THIS new tool, invented by C. H. ticed that the device consists of several rotary bits-five in this case-and that the leader (the bit which starts the cut) is an ordinary wood-boring bit mounted

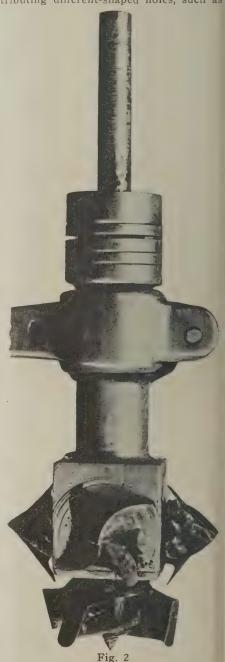
The bits are entirely interchangeable; each one is drilled and tapped at the back to fit the threaded ends of the horizontal spindles. It will therefore be apparent to any mechanic that by distributing different-shaped holes, such as



Photographs by Keystone View Company, New York Fig. 1

and marble. There is this difference in drilling the harder substances, howeverusually two operations are required; that is, the round hole is first drilled, then it is squared or shaped as required in a final operation, whereas wood is bored in a single operation.

The accompanying picture, Fig. 2, shows the complete tool fitted for boring a square hole in wood. It will be noin the usual manner on the lower end of a central vertical shaft. The four coneshaped or V-bits which square the hole are mounted on short horizontal spindles radiating at equal angles from the central vertical shaft. The four horizontal spindles are geared with miter pinions to the central shaft, but the gearing is inclosed in a compact square casing as



diamonds, ovals, etc., or any shape can be bored which can be "built up" around a square-see Fig. 1. For boring threecornered holes a sleeve with a threesided casing containing three radiating spindles, is used, and similarly a hex-

agon casing containing six radiating spindles is used for boring perfect hexagon holes. There is really no limit to the number of combinations which can be worked out on this principle.

The miter gears in the casing of the tool are so proportioned that the horizontal bits rotate about one-third faster than the large vertical bit, therefore they will cut rapidly and freely at any ordinary boring machine speed. In demonstrating the tool, Mr. Schmidgall has run it at various speeds up to 2,000 r. p. ra. In operation the horizontal bits throw

all shavings and dust upward out of the hole, as they cut their way into the wood.

In case it is desired to bore a square or other shaped hole only part way through a block of wood, the leading bit, which bores the preliminary round hole, can be removed (when the round hole is made) to let the horizontal milling cutters down into the bottom of the hole. In squaring a round hole in metal or stone, the leading bit is replaced with a disk just large enough to fit the hole nicely. This disk then advances through the hole just ahead of the milling cut-

ters and serves to keep them in perfect line with the round hole.

The casing which contains the horizontal bits is prevented from turning by being securely clamped in the jaws of an extended arm, as shown. This arm also serves to steady the bit as it enters the cut. The arm can be made stationary—in case it is desired to advance the work to the tool—or arranged to slide in ways fastened to the machine frame, in case the bit is advanced to the work. Ball-bearing end-thrust collars are mounted just above the jaws of the extended arm.

A Typical Housebuilder



One of Theodore Martin's houses planned and designed by himself

In THE past five years Theodore Martin, of Desplaines, Ill., has planned, designed and built houses in his neighborhood representing a total cost of upward of \$250,000. He buys as he builds and carries no stock. The illustrations show Mr. Martin and one of his recently completed houses—now occupied by himself until he finds a purchaser. He says that his method is to work out a plan first and then devise an exterior design that will "look good," adding such embellish-

ments as his fancy or someone's suggestions may dictate. Mr. Martin represents a very numerous class of practical builders, and it is to reach these with representations of the most acceptable plans and appropriate architectural designs that is one of the chief aims of NATIONAL BUILDER. Architects of high ability and builders of successful houses are contributing to these pages a wealth of suggestions and practical plans and from these collections there is spreading



Theodore Martin, Builder

an influence for better selections both in plans and designs.

Licensing Building Contractors

Since June 21, Wisconsin has had a law passed licensing all building contractors, and executive boards of all towns will be required to enforce the law. A committee of three has been appointed in Milwaukee to plan the requirements of the license, and under what conditions the building contractor shall be obliged

to live up to the law, which is practically an amendment to the law licensing electrical contractors. The application of the law licensing electrical contractors reduced the number of such contractors in Milwaukee about thirty per cent.

It is evident that the trend of things is toward society getting some sort of

control over all kinds of producers, and putting them over the jumps to prove that they know something about the things they have to sell to society—either in manufactured material or their own individual skill.

In any event the vocational schools will contribute the craftsmen in future.

Brick Veneer on Frame

THE brick veneered house is probably a product of the Middle West, or at any rate it has attained greater popularity in that locality than in any other section of the country. This type of construction has been called a sham in that the real construction is not evident; it pretends to be something it is not. This criticism is not altogether fair. If this line of reasoning were consistently applied by the critics of brick veneer they would also condemn practically all of our larger modern buildings in which steel or reinforced concrete structural members are used to support other materials such as brick, terra cotta, or stone. In fact, they would be forced to go even further and criticise our friends the Romans, who did not hesitate to use marble veneers as a facing for the crude rubble-concrete walls which were the real supporting members of many of their important buildings.

Brick veneer has several advantages over the solid brick wall. It makes a warmer wall because of the air spaces between the studding of the wood frame. It is more apt to be damp-proof for the same reason, providing that good quality waterproof felt is placed on the sheathing. It is usually cheaper, although the difference in cost between the two is often very slight, especially in localities where brick is plentiful.

Brick veneer's chief advantage over siding is that it reduces the fire hazard somewhat, although of course, an interior fire will consume a brick veneered wall almost as rapidly as it will an ordinary wooden one. It also costs less to maintain a brick veneered wall and it probably prolongs the life of a building. The difference in cost between a first-class wall with siding and one with brick veneer varies, but in general it amounts to about 5 per cent of the entire cost of the building.

The wood frame for a brick veneered wall is built just as for any ordinary frame house. But more care must be paid to making the walls plumb and line in every respect so that it will not be necessary to clip the bricks around uneven places on the wood frame.

A brick veneered wall will average about 10½ inches in thickness, %-inch for interior plaster, 35%-inchs for studding, 1 inch for sheathing and paper, 1 inch air space and 4 inches brickwork. The bricks are sometimes laid on edge, this of course reduces the wall thickness and also saves on brickwork, but it is not considered good practice, as it does not give as good protection from damp-

ness and the wall is not so stable. Water must penetrate four inches of brick to reach the inside of a brick veneered wall in which the bricks are laid in the usual manner, against only two inches when they are laid on edge.

In a brick veneered wall the face of the sheathing finishes about 5 inches back from the outside face of the foundation wall in order to leave a ledge to carry the brickwork. The frame should are left with their heads projecting out over the brick almost to the edge and are then bedded in the mortar for the next course; several more courses are next carried up and the operation is repeated. When nails are used for this purpose they should be long enough to allow their points to project beyond the sheathing so that they may be clinched on the inside, otherwise they may work loose.

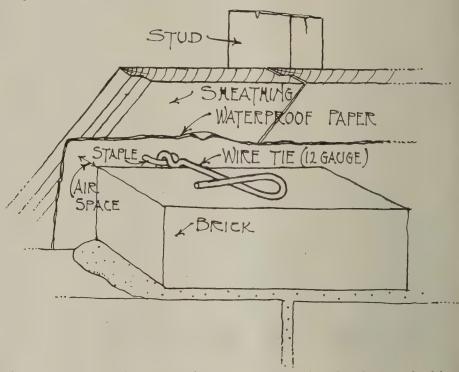


Fig. 1—Ties are sometimes made with one end sharpened so that they may be driven into the sheathing

be well built with doubled studs around all openings, doubled plates and corners, and well spiked to the sill. The sill should be not less than 4x6 inches in size and anchored to the foundation wall by 5%-inch bolts set in the wall about 5 feet apart. The interior partitions, floor and roof framing, and so forth, should all be in place before any brickwork is laid so that excessive swaying of the walls will be prevented.

The sheathing should be laid diagonally to stiffen the walls and should be tightly covered with first class water-proof paper. The sheathing must be securely nailed to the studding as it must often resist considerable pull from the brickwork to which it is attached.

There are several methods of attaching the brickwork to the sheathing. One way—somewhat out of date—is to lay up four or five courses of brick and then drive a row of nails into the sheathing, one nail for each brick. These nails

The best way of attaching the brick veneer to the sheathing, however, is to use one of the various forms of metal ties that have been designed for the purpose. There are several types of these ties, each of which has its own adherents among experienced men. The users of wire ties argue that this type is more effective in preventing the passage of moisture to the wood frame; while the defenders of strap ties say that their type gives a better surface for the mortar to grip, especially if they are of the corrugated type. No matter which type is preferred, the metal should be well galvanized to prevent rapid rusting. Copper ties were extensively used at one time, but the present cost of that metal makes its use almost prohibitive for this purpose.

It is a good idea to provide some means of getting rid of any surplus water which may penetrate the brickwork. This may be accomplished by

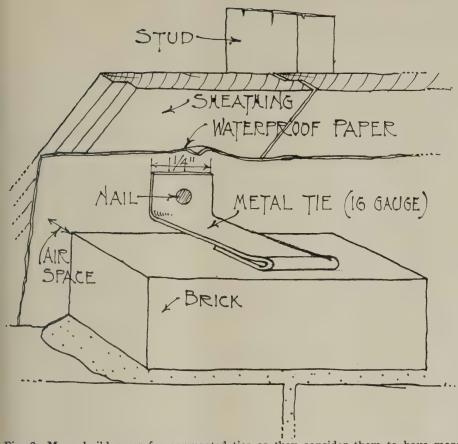


Fig. 2—Many builders prefer corrugated ties as they consider them to have more holding power than the ones made of flat metal

forming a small channel or gutter on top of the foundation wall just under the air space between the brick and the sheathing. This gutter may be drained by means of small tubes leading to the outside or else weep-holes may be left in the joint between the first course of brick and the foundation wall. Similar holes should be made near the top of the wall so that the air space will be well ventilated.

In veneered work the bricks above openings are carried on steel or stone lintels just as in ordinary brickwork.



Fig. 3—This photograph shows the air space between the sheathing and the brickwork



Fig. 4—Concrete blocks ready to receive brick veneer. Note the metal ties embedded in the mortar joints

Stone instead of brick may be used for veneer if desired, but this material is quite expensive when used in this manner, as it requires an excessive amount of cutting and fitting at the back. It has been used, however, by fastening the metal ties directly to the studding and using sheathing-board on the inside to take the place of the ordinary sheathing which is omitted. This latter type of construction is not recommended.

HOTELS AND APARTMENT BUILD-INGS IN DEMAND

S. W. Straus, the investment banker, states that as a result of the shortage of servant labor, higher rentals and the increasing cost of all household supplies, a distinctively new tendency has developed in the building industry, which is manifested in an unprecedented demand for large apartment houses of the residential hotel type. Modern ingenuity has created this form of construction to the end that many of the objectionable features and inconveniences of the individual home are eliminated.

The servant problem has been a vexatious one for some time and is likely to become more acute with restricted immigration and a higher scale of wages in other lines of activity. The newly developed type of apartment hotel furnishes maid service and meals, so that in the family there is saved the inconvenience and expense of marketing, preparing meals and maintaining a kitchen. As the supply of household servants becomes more scarce and the density of population in our great cities increases, there will be a continued strong tendency toward the construction of apartment houses and family hotels.

In the principal American cities today, many of the most important building projects are hotels of either transient or apartment type. In the various complexities of modern life, it is becoming more necessary for people to travel, and people also are traveling more as a means of education and diversion. These conditions are reflected in a demand for better and more commodious hotel accommodations, which tendencies will continue with the development of better transportation facilities.

There was a time when a trip across the American continent was considered a long and hazardous journey, but the day will soon come when New York and San Francisco will seem like next door neighbors, for the airship is quickly annihilating distance, just as the telephone and telegraph have done. As a result of these various fundamental conditions, the present marked trend toward the growth of hotels of all types will continue to be one of the outstanding features of the building industry.

A Low-Cost Small House

N designing a low cost small house there are three main requirements to be considered. First, the plans must be compact. This does not mean that the rooms must be unduly small, but it does mean that the rooms must be fitted to-

quently just the opposite from that which is intended. That is, instead of distracting our attention from the defects in a design, they often cause us to attempt to reason out why they are used and thereby we become conscious



gether in such a manner that there is no waste space in the halls, closets, roof and minor rooms.

The second requirement is that the plans must be simple. Jogs and breaks of the trickery and are inclined to condemn the entire building.

The accompanying sketches illustrate a small house that is compact and free from irregularities of plan. The first

DINING R'M I.VING R'M KITCHEN -

in the walls must be avoided to prevent complications in the arrangement and to cut down the extra cost. The third thing to be considered is the detailing. Most of our houses would be improved if about half of their details were removed. Too much of our detailing is done for the sake of mere prettiness. It has no sound reasoning behind it. Details are sometimes used in an effort to cover up a poorly-designed building, but when so used their effect is fre-

floor is unusually satisfactory. The arrangement of the entrance and the stair is well thought out and results in a very economical and practical layout-The veranda at the end might be glazed in for all-the-year use. The opening between the living room and the dining room might have French doors to give these rooms more privacy. The pantry is compact yet amply large for such a small house.

The second floor is not so compact as

is desirable. The smaller bed room does not have cross ventilation and the hali is rather long. The large bed room would make a very pleasing room and the numerous closets throughout this floor would be very acceptable to the housekeeper.

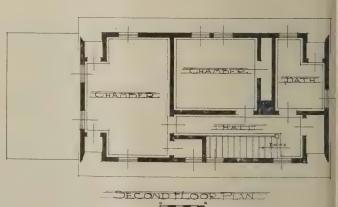
The perspective shows an attractive house, somewhat Colonial in style. The frieze under the cornice is unusual and could be made a very effective feature This house was designed by Charles A.

THE SEPTIC TANK

During the coming season there will be more work done along the lines of rural sanitation than there has ever been done before in the State, says F. A. Meckel, of the University of Missouri College of Agriculture. Surveys of water conditions and analyses of many samples of drinking water have shown that over 50 per cent of the samples have been contaminated with the germ which causes typhoid fever.

This germ finds its way into the source of drinking water through seeps from decomposed wastes, showing that unsanitary conditions are prevailing throughout our rural districts.

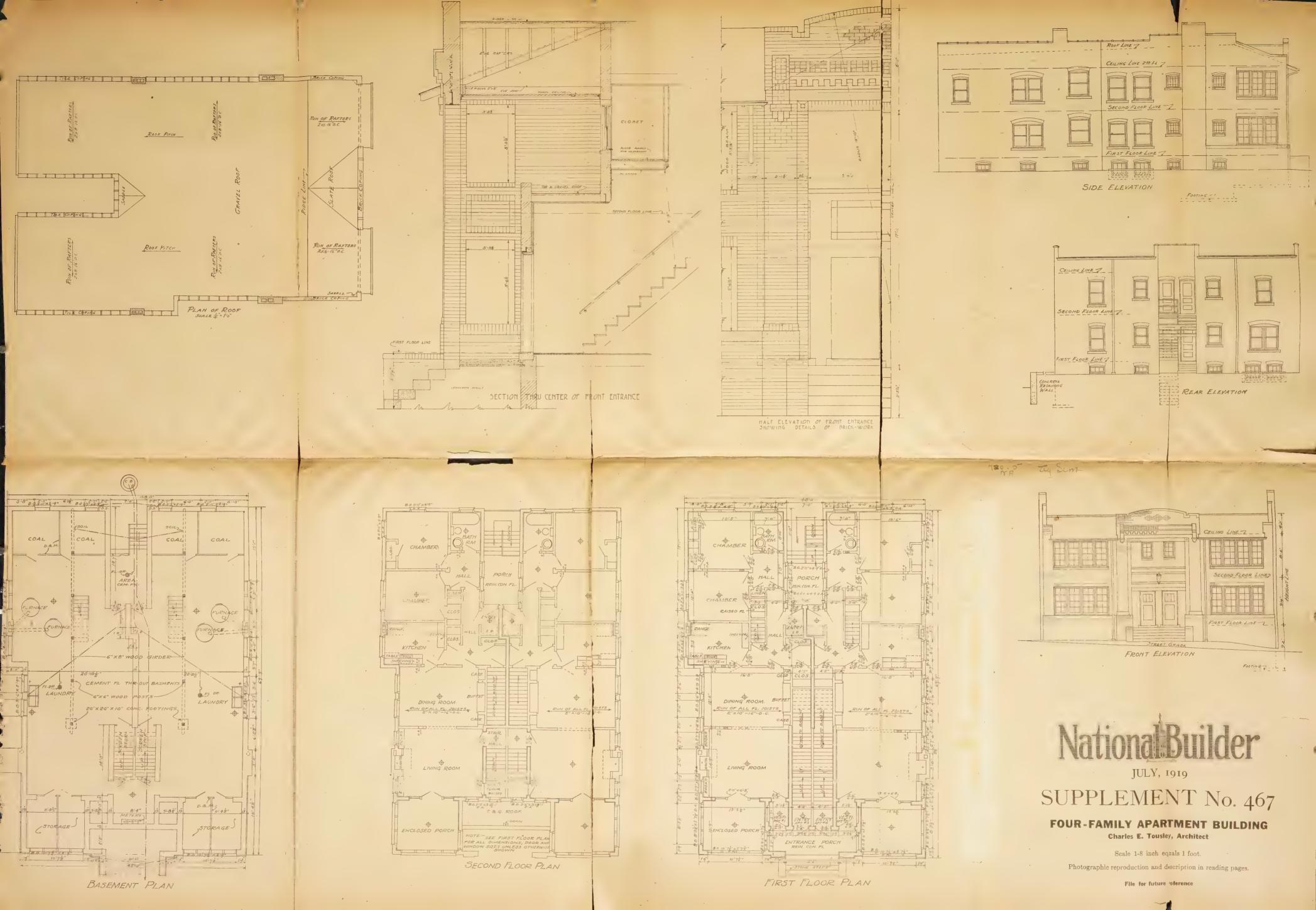
The septic tank offers a very cheap and efficient means of preventing the seepage of any harmful material into wells or cisterns, and besides, it renders sewage harmless through the septic ac-



tion which takes place within the tank The Department of Agriculture Engi neering has been called upon very fre quently to furnish blueprint plans of single chamber septic tank, as well a sending a man out into the field to dem onstrate the installation of one of thestanks in a community.

The blueprint, No. C-32 will be sen to anyone upon the receipt of ten cent in coin or stamps. Address Departmen of Agricultural Engineering.





NATIONAL BUILDER

Vol. 62

Chicago, September, 1919

Number 9

"BIG MONEY"

The Responsibility of "Big Money" is Not Understood—Instead of Increasing Production it is Decreasing Production—Yet on Increased Production the Reduction of Living Costs Depends

BUILDING material costs, as has been shown, are the lowest in the scale of costs of all the industrial commodities. The cost of living has placed a heavy burden on the building industry, and yet notwithstanding this burden, building offers to the investor and the home-maker an avenue through which the savings of today can be greatly increased in the near future.

The race between the cost of living and wages apparently shows the cost of living in advance if we accept the figures of the New York State Industrial Commission as a barometer of conditions elsewhere. This survey includes June, 1914, to March, 1919, and embraces 1,364 establishments with 420,000 employes, representative of all factors in the State of New York.

The commission compiled the following table showing by months the average weekly earnings and the retail prices of food, as follows:

1914

191-		
	Average	Retail
	Weekly	Food
To		Prices
JuneJuly	100	100
July	. 99	103
August	. 99	108
September	98	108
October	. 97	106
November	. 97	106
December	. 99 .	106
Average for year	. * 98	105
1915	. 98	104
January	. 90 . 00	104
February	. 98	99
March	. 100 -	100
April	. 100	101
May	. 101	101
June	. 100	101
JulyAugust	. 100	101
Soptombon	. 101	101
September October	. 101	102
November	. 106	105
November December	. 106	105
December	. 100	100
Average for year	. 101	102
		102
1910		400
anuary	. 107	108
February	. 108	107
March	. 110	108
April	. 111	110
May	. 112	110

June	113 111 114 117 118 119 122	113 112 114 119 122 127 127
Average for year	114	115
January February March April	120 121 124 122 127	129 134 134 146 153

"The government has taken up with all its energy the task of bringing the profiteer to book, making the stocks of necessaries in the country available at lowered prices, stimulating production, and facilitating distribution, and very favorable results are already beginning to appear. There is reason to entertain the confident hope that substantial relief will result, and result in increasing measure.

"A general increase in the levels of wages would check and might defeat all this at its very beginning. Such increases would inevitably raise, not lower, the cost of living. -President Wilson.

June July	128	154
Tuly	127	. 147
August	129	151
September	134	155
October	136	159
November	139	157
December	139	159
December	107	
Average for year	129	147
1918	+122	162
January	*132	162
February	139	163
March	147	156
April	152	156
May	157	160
June	161	164
July	164	169
August	167	173
September	176	180
October	176	183
November		185
December		189
December	100	
Average for year	160	170

1919		
January	181	187
February4	174	174
March	175	177

*Drop due to fuel administrator's clos-

ing order.
**Drop due to closing of factories

Nov. 11 (Armistice Day).
"One of the most sagacious labor leaders" is quoted as saying that it was an open question how much higher wages would go. "It is this way," he said. "The workingmen are beginning to think that we are now at the crest, and that soon there will be a subsiding of the cost of living prices. Once this starts they know wages can't be pushed higher, so the general movement in the groups is to shove wages as high as possible while the shoving is good and before the receding movement strikes the prices of necessities. This explains much in the industrial unrest."

It is not so much high wages that atflict the building industry and many others, but the limitations put upon certain kinds of workmen on the one hand, and the lack of discrimination between partly skilled and highly skilled workmen, on the other. This is shown in what is called "jurisdictional disputes," and is one of the most detrimental features afflicting the trade union movement which has been unable by its own strength to shake off its old militant form and take on the constructive form which is its ultimate destiny.

That there is vastly more lost in fighting for a principle that might in a small degree prevent unscrupulous employers from manipulating skilled and unskilled labor than would be lost in adopting more business-like methods should be obvious. But the sincerity of the proposition that any man should be free to do what he can and so develop his skill and knowledge is disallowed in the heart of a movement that stands for the betterment of all toilers. Practical politics would throw the jurisdictional muddle into the discard for there is work and wages enough for everybody if they will go to it.

«As We See Ourselves"

Reproductions



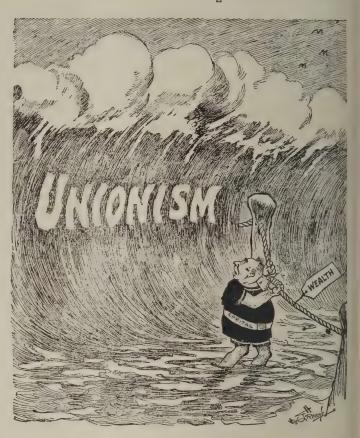
When They're at the Critical Stage Angels Couldn't Be Sweeter



Copyright, 1919, New York Tribune



"If Capital and Labor Don't Pull Together" Copyright, 1919; John T. McCutcheon, in Chicago Tribune



From the Milwaukee Sentinel



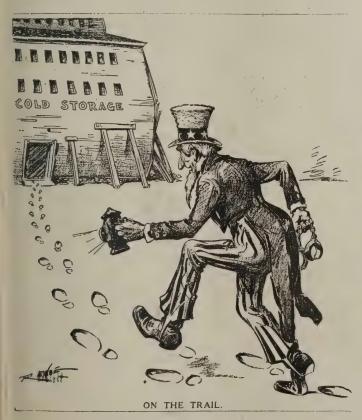
From the New York World

-By the Cartoonists

by Permission



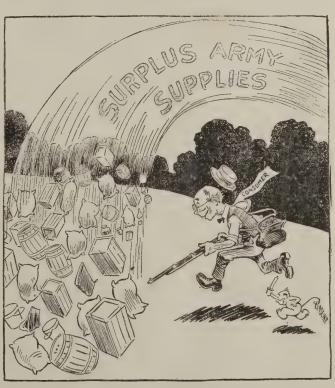
"Carrying it to Congress"
Copyright, 1919, New York Evening World



From the New York World



"Lured into the Morass of Discontent" Copyright, 1919, Philadelphia Inquirer Co.



"The Barrage"-Louisville Times



A House for a Corner Lot

Supplement 469

THE house for a corner lot offers an altogether different problem from the one that is to be built on an inside lot. In the first place there is the matter of plan. The average city or town lot is so narrow that it is usually a settled fact that a house located on an inside lot must have the entrance on the street front. After we once get inside more variation is possible, but our plan is always influenced by this requirement for the placing of the front door.

A house for a corner lot, however, has two fronts and consequently we have two possible locations for the entrance. This fact has given rise to many unique arrangements and vastly increases the possibilities for doing something unusual. In a case of this kind we usually have one wide front and one comparatively narrow one, and it is a matter of common observation that almost invariably the designer will choose the wide front for the front entrance.

His selection is no doubt influenced by the fact that usually he can develop a more satisfactory plan by so placing the front door, but at the same time he is probably alive to the possibilities of doing something out of the ordinary in the way of design. The fact that he has two fronts to work with instead of one also stimulates his imagination and often results in a composition that is full of life and originality.

In designing a house for a corner lot it is not necessary to place the entrance on the side of the more important street. In fact it is often desirable to use the side toward the less important street for this purpose so that the utmost privacy may be assured. This is almost always true in cities and large towns where people are usually somewhat tedup on looking at other people and desire as much privacy as it is possible to obtain.

The entrusting of the design of a corner house to careless hands may easily prove a failure both from a standpoint of looks and of practicability. It is also quite easy to overdo the thing—make too complex a problem out of a simple one. It is easier to criticize a thing that is overdone than one that has an unfinished air. There are always apparent possibilities in the latter.

The house chosen for the supplement this month was designed by H. C. Haeuser, architect, for Mr. W. G. Coapman of Milwaukee, Wisconsin. In its arrangement it is essentially a bungalow, but the use of the attic for bed rooms and the general appearance of the exterior place it more definitely in the cottage class.

The type of design adopted by the architect is a modified English treatment and the success of the building indicates a thorough study of the problem from every angle, resulting in a very attractive and livable home.

The Working Plans of this Bungalow are given in the Supplement in this Issue

The exterior finish is of narrow siding painted a rich golden brown. The trim is white, and the posts supporting the porch roof and the timber work in the gables is painted a bluish green to contrast with the siding. The large gables are shingled and also painted with a golden brown. The color effect is remarkably good and results in a freshness that is very attractive. It will be noted that the chimney shown in the drawing is missing in the photograph. This chimney was moved over to the wall next to the other building and serves a fireplace in the living room along that side.

The entire area under the house is excavated and forms a basement with laundry, vegetable cellar, furnace room and a large storage space. There is a wooden partition separating the laundry from the remainder of the basement. This helps to insure clean clothes when it is necessary to use the laundry as a drying room during wet weather. The basement has a cement floor throughout and is lighted by cellar sash set above grade to avoid the use of areas. The porch is supported by concrete piers and wood beams which carry the joists.

The first floor is somewhat irregular in plan, which results in excellent light and ventilation for the principal rooms. The porch has a wood floor and the large wooden posts have a substantial appearance that is quite pleasing. The steps leading to the porch are of brick.

The offset at the entrance door is a clever way to prevent the open door from blocking the passage which leads to the other rooms. The living room has windows on three sides which as-

sures plenty of light and ventilation. The grouping of the seat and bookcases around the casement windows at the end makes an attractive composition. In the building as built a fireplace was built between the two windows in the wall opposite the front door.

A small alcove gives access from the living room to the other portions of the house. There is a plaster arch between this alcove and the living room.

The dining room opens from the alcove and it also contains windows on three sides, although they are too close together to be as efficient as those of the living room. The dining room has a built-in group at one end similar to that in the living room. It also contains a recess for the telephone. This is probably as convenient a place as any for a 'phone when its accessibility from the kitchen and the living room and also privacy are considered.

The kitchen opens directly into the dining room and is fully equipped with built-in cabinets, ironing board and so forth. The rear entry is of the grade line type with a stair to the basement and a space for the refrigerator. There is also a cooling cabinet in the outside wall of the entry.

The bed room on this floor is convenient to the kitchen and is excellently ventilated by windows placed in the extreme corner. The closet for this room is ingeniously provided for.

The bath room is well placed and contains a clothes chute to the basement. The linen closet is rather small, but cannot well be changed unless the coat closet is given up. The stair to the second floor is located in the rear hall and has been treated as simply as possible to cut down expense. This subordination of the stair helps to simplify the plan, but if a more decorative treatment were desired the wall between it and the living room could be removed. With such a treatment it would be necessary to carry a partition across the passage on a line with the bath room wall. This partition would of course have a door leading to the passage.

The second floor contains only one bed room, but there is ample space for another and possibly two additional small ones could be arranged for. The existing bedroom is well ventilated and contains a large closet. There is a large linen closet on this floor, and also a clothes chute. In the unfinished portion heating stacks have been provided for future registers.



VERY mechanic is not a contractor, E and the reverse is also true—every contractor is not a mechanic. The ability to conduct a contracting business is an entirely different faculty from the ability to use tools and practice a trade.

Probably no one thing contributes more to the success of a contractor than the knowledge of his own shortcomings. We all have them, goodness knows, but when we know it we can take steps to correct them. We can by a judicious use of our power to grow, sharpen our wits, and profit by the knowledge that comes and the desire to improve.

The contracting business is a real business that brings into play all the faculties of a man. The contractor is just as much a buyer as the highest paid purchasing agent of a great manufacturing company. He must therefore have a good knowledge of buying. How to get the best prices; where to find the class of goods he wants cheapest, quickest and with least exertion.

Every contractor is a seller as well, for he sells his services and his salesmanship must be even bigger than his purchasing ability. A contractor might

lose a little money by unwise purchasing but he will actually lose his business if he hasn't the salesman qualities necessary to create customers.

Nine-tenths of the contractors now in the field probably came up through the ranks of the mechanic. A carpenter or a mason learns his trade at the bench or



Plate A—The contractor occupies a mighty important place in his communbut he doesn't always succeed in building up a profitable business. succeed you must be aggressive but not combative and above all things you must always be reliable

on the wall, works as a journeyman and finally goes into business for himself.

A considerable number of these would do better to remain in the ranks instead of stepping out and attempting to take their place as contractors. It is much better to be a good mechanic than a poor contractor. As the former you can win more of this world's goods. As the latter without business sense your uphill fight will most likely end in failure.

Contractors fail because they have not the all-'round ability to run a business. As mechanics, working on a wage they might be wonders, but when it comes to buying and selling, hiring men, bossing employes, treating with customers, figuring out problems, collecting bills, keeping accounts and establishing credits they are swamped.

You can't expect everything of one man and it is often the case that a man who is a great success as a contractor was but a poor mechanic. The fact that he can or cannot hammer or saw with the best of them has nothing to do with his contracting ability. As a contractor he can hire others to hammer and saw for him and they may be able to do it in



Plate B—Much of your business, contractors, comes from the architect. Cultivate him. You will find he is a regular fellow, much like you—that is to say, he will appreciate good service from your firm; he has enough to worry about and appreciates it when you look after your own troubles

a much more able manner than he could do it himself. But he can't hire men to run his contracting business for him, and it is fortunate he cannot. If there was a man smart enough to run a contractor's business for him that man would soon have the business.

A contracting business is a personal business. It is built upon the personality of the firm quite as much as the lawyer's or doctor's practice. To be sure much of the building business is secured by competitive bids but you don't get a chance to bid unless your reputation is good. Reputation is personality. You get it by what you do, not by what you say you do.

If a contractor starting out to win suc-

cess could be made to order in the first place, this is about the way you would make him; first, you would give him a fairly practical knowledge of all the trades included in his branch of the work—not necessarily a sufficient knowledge to practice them with his own hands.

men are doing but a 2-spot business. They can do jobs but they can't get jobs.

Another quality our made-to-order contractor needs is a faculty for getting the loyalty of his men. His men must like him and he must appreciate them, for the contractor must be just as truly



Plate D—Here is another mistake—the wrong cuts in half the rafters on this roof. Was it the fault of the mechanic, the foreman, or the boss? These mistakes cost the boss money whether he is responsible or not

Next, you would give him the ability to get jobs. That's the most necessary gift a man can have in any business, contracting or otherwise, and many of the most able contractors in the world (so far as practical ability alone goes) haven't it. That's why so many 10-spot a leader of men as the colonel of a regiment in the United States Army.

Now, we would add a little good, sound business sense—the kind that makes a man keep up his office in a business-like way, with his accounts up-to-date and the habit of giving his customers the same kind of efficient service they get in any other line of business and which, unfortunately, is not always the class of service to be had of a contractor.

Next, add a liberal quantity of "pep," with the customary percentage of health, and, located in a town where business is there is no reason why our made-to-order contractor should not make money.

The first place the contractor's shell fire for new business should be directed, is at the architect. In conducting the campaign remember that an architect is a purchasing agent for his client. He buys a completed building and it is up to you to give him completed work. If the architect has to push you, and plead with you to get the job done he may get some other contractor next time. On the other hand, if you drive right ahead and carry the work to completion automatically with no urging, you'll make a hit that may prove of lifetime profit to you.

Saving money is making it and the first chance to save money is by curtailing the unnecessary waste of your men. Keep an eye on them and give them the



Plate C—A thoughtless carpenter framed this dormer and sawed the studs off at the rafter line. Later, he was obliged to put in new studs down to the floor. "Why didn't you do it right in the first place?" inquired his boss. "You didn't tell me," was the excuse. Lots of money lost every day because the boss "doesn't tell."

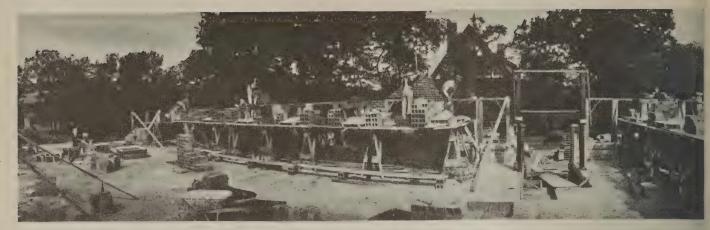


Plate E—When you go to visit a well managed job like this you can almost bet the contractor is making money. Not too many men and every man busy. They hardly looked up, even when the camera-man set up his instrument

benefit of your brains. As an example of waste note the framing of the dormer illustrated in Plate C in which the carpenter sawed most of the studs off at the rafter line. Later, it was neces-

Plate F—Did any of your men ever fall from a scaffold? Many a defective scaffold has caused broken limbs or worse and, too often, the direct cause was propping horses up on loose bricks. Don't leave scaffolding to your laborers, wour foreman responsible

sary to apply more study down to the floor. It was a little thing but it wasted lumber and time.

It is appalling how good-naturedly mechanics sometimes take their own mistakes, forgetting seemingly, that every mistake costs the boss real money. An entirely preventable mistake is shown in Plate D. The carpenter made a wrong cut on this rafter and about twenty-five or thirty more. The heel came in the wrong place and it was necessary to

make new cuts to fit the plate properly. The timber wasn't spoiled but a lot of labor was thrown away.

When you go on a job for inspection you can almost tell whether the contractor is a money-making man or not by the way the job looks. If the men are busy, material is piled up neatly within reach, scaffolding is sufficient and skillfully placed and there is a general air of well-managed industry you can just about guess that job will bring in a good profit to the contractor. (Plate E).

The young contractor just starting in business sometimes drives ahead of his older competitor just because he is more up-to-date than the latter. That is the handicap older established firms always have when new blood gets into the field. Youth is usually more inclined to take up with new ideas and often these later methods are more efficient. Old firms who have been doing business for forty years along certain lines may get into a rut. For this reason it is usually a wise

thing for older firms to take some young blood into their organization. It may give them just the additional "pep" they need and, coupled with the experience and standing of the older members of the firm, may put just enough more "punch" into the work to bring success.

"Safety first" must of course be given first consideration unless the contractor wants some damage suits on his hands. Workmen doing the same kind of work day after day are prone to be careless and it is necessary to keep an eye on them for their own safety. One of the surest ways to invite catastrophe on a scaffold is to prop horses upon loose bricks (Plate F). Every once in a while a prop gets knocked out and a broken limb is the result, if not more.

How much time is lost on jobs when carpenters prop up window frames in the manner shown in Plate G? These scantlings sticking out at such an acute angle occupy too much space and make mechanics and laborers take too many



Plate G—This looks like a flimsy way to anchor window frames. The scantlings are in the way and they will be easily knocked down, possibly making it necessary to set many of the frames again. Duplication of work is expensive for the contractor

unnecessary steps. At the same time the frames are so poorly anchored that the slightest accidental knock against a prop may drive a frame out of plumb.

Contractors who want to make money should have a good equipment to save labor as much as possible. Part of the necessary equipment of a contractor should be a small winch or elevator for hauling material up to the top floor instead of requiring laborers to take it up long distances in hods (Plate H). When



Plate H—Many an extra laborer plods wearily up the ladder because his boss doesn't know the economy of an elevator. Even a block and tackle can be utilized to haul up material. Then there are dericks for every purpose; cheap, convenient, labor-saving, money-making

a job is started look the ground over thoroughly and lay your plans accordingly. Make things convenient for your men and you will find the profit will be correspondingly increased.

Some provision toward the personal comfort of the workmen should be made on every job. Sanitary conveniences on a new job are necessarily very crude, but a few cents worth of quicklime and toilet paper will aid materially in reducing the most objectionable features. An adequate supply of pure, cool, drinking water will help to overcome the natural irritation that dog days brings to men doing manual labor.

Before a spade full of earth is dug on the premises let the ambition of the contractor be to make that job yield the percentage of profit to which every contractor is entitled—not by "skinning" the job but by calm, skillful management. Keep things moving right along and do this by moving right along yourself.

FOUNDATIONS

By Ivan D. Wood

THERE is an old familiar story about the house which was builded on sand and of the sad fate which befell it. The man who builds with poor foundations on solid ground ranks in the same class

to do it, if you desire a crib which will hang together and hold corn. This particular crib was considered unfit for that purpose after a few years' use and served as an evesore to litter up the landscape.



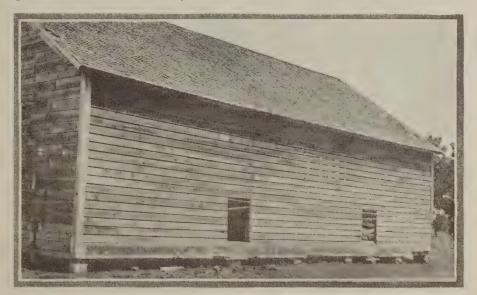
An Object Lesson

with the one who chooses the sand bar. There are many practical ways to economize in construction but leaving out the foundation is not one of them.

When you see a sway-backed barn, a wall out of plumb, a big crack in masonry, or a porch warped out of shape, just charge it all to want of proper footings and you will not go far wrong. Consider figure 1 and behold economy in its

Of all buildings on the farm, the corncrib and granary need the best foundations.

A good footing consists of a wall or pier of masonry extending down below the frost line or to solid earth and of sufficient bottom width to bear the load imposed upon it. Had the crib shown in these figures been given a bearing on a concrete foundation 12-in. wide at the



Wasted Labor

dearest form. The foundation under this crib consisted of a few brick piers laid on top of the ground, several flat stones, four round boulders and a mower wheel. Figure 2 gives you an idea of how not

bottom, 8-in. wide at the top where the 8x8-in. sill was laid and had this foundation extended below frost, say 3 ft. 6 in. below the surface, the building would have been serviceable today.

The Builder's Advertising

ONE of the most important things in a builder's business is appropriate business stationery. It tells who you are, what you are-and according to its style gives a favorable or unfavorable impression of your business standing. Therefore, a simple, clean, dignified letterhead, envelope corner card, and a business card in the same style, should be carefully selected and the style adhered to. Have it always the same. Have your bills and statements of the same style, so that the general appearance of any of these can almost be identified as yours before the lettering is read. Choose a good standard stock-white or tintedand always use that kind. Don't allow your printer to put in ornaments or curlicues-make it straight-out, simple design and simple lettering. You can get samples from any of the big printers or paper houses. Take a little care and time and if you are in doubt get a little advice from those who know the right





A neat sign backed up by an attractive building makes a combination that draws the attention of every passerby. Such desirable space can't be bought after the building is completed, so take full advantage of it while you may

thing. These paper messengers have a bigger effect on the buying public than you may have any idea of, and they have a big effect on those you buy from and on your business generally.

The builder who neglects any opportunity to make a bid for publicity is losing money. The builder who persistently keeps his name before the public is sure to be the gainer. This is an era of advertising; millions of dollars are spent yearly under the direction of experts whose fees are limited only by their

ability to obtain results for their clients. The keynote of success in advertising is to keep everlastingly at it. Adopt a policy that is suitable to your line of work and then keep pounding away at it. Don't make the mistake of neglecting your advertising as soon as it begins to make money for you. Many advertisers of ten years ago whose names were household words are unknown today because they thought they were so well known that they could stop advertising.

The average builder of course is not

concerned with national advertising, what he needs is local publicity; some method whereby he can attract the attention of people in his immediate vicinity. Probably the most effective means of doing this is by means of signboards and plenty of them. A signboard should contain the name, the business and the address-nothing more; too many words spoil its effectiveness. Have one or more signboards on every job you do, whether it is a hundred dollar remodeling job or a million dollar skyscraper. If possible have the signs illuminated at night; people are then in a more receptive mood and there is less to distract their attention. All of your



Each member of the firm should have a neat signboard on his home. This one is easy to keep clean, as it is glazed and has a metal frame

heavy equipment should bear your name and materialmen should be furnished with signboards to be placed on all loads of material that are delivered to your jobs. Run a permanent advertisement in your local newspapers and when you



This illustration shows the method used by a prominent builder of Bethlehem, Pennsylvania. In this case the signboard is mounted on the motor housing of the concrete mixer

have a new job notify their news departments, they will often give it notice as a news item.

Newspaper advertising is another field

is necessary to use considerable ingenuity in order to attract the attention of the average reader. Cuts are highly desirable for this sort of work and line



A novel method of obtaining publicity used by a Cleveland painter. The enclosed car is used for hauling supplies to the job, and the trailer is for ladders, etc.

of publicity and requires different methods from those employed in outdoor advertising. In newspaper advertising it



Plain, black lettering on a white ground makes a sign that is easily read at a glance. Remember that busy people haven't time to stop and puzzle out the meaning of a jumble of fancy lettering drawings are superior to photographs for newspaper reproduction. The line drawing must be very attractive in its execution, however, as a poor drawing will do more harm than good. The text which accompanys the cut should be very, very short and to the point and should refer to the subject of the cut. Twenty or thirty words are as much as the average reader of advertising will digest.

A method of reducing the cost of a large number of signs is to use a stencil. Stencils can be bought from a manufacturer or they may be home-made. For the latter use heavy manila paper well oiled to prevent ragged edges and sticking, or have the tinner cut one out of metal.

A neat signboard prominently displayed on equipment has considerable



This man is not taking full advantage of his opportunities; his name should appear upon the signs, so that people will know that the painter—not merely a painter—lives here

value from an advertising standpoint. Painting the sign on the equipment itself is not so good, as the lettering soon becomes covered with dirt and grease.

Many other ideas for obtaining publicity will occur to you, but don't be too ambitious nor too spectacular in your methods—fireworks are all right for the Fourth of July, but people soon tire of them. If you start out in a big way, your advertising may break you before you begin to get results. There's an old proverb (French, we believe) that cautions us to "make haste slowly"—it's a good one for a builder to remember when he begins to advertise.

Power Drills

Power drills have no extended usefulness on the ordinary job, but they should have considerable value in wrecking large concrete structures.



The accompanying illustration shows a power drill cutting away a portion of sidewalk to allow the installation of electric light standards. It is going through the hard concrete like the proverbial hot knife cutting butter.

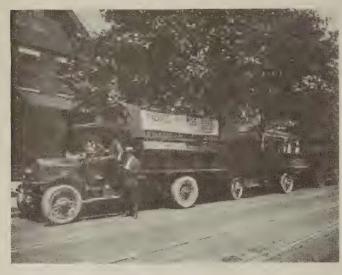
Have You a Sideline?

This Man Bought a Motor Truck a Little More Than a Year Ago—He Now Has a Fleet of Four Trucks and Makes Them Pay

IT is rapidly becoming evident that the modern builder who expects to be successful must devote considerable time and effort toward developing new business. In almost every other line of business the proprietor deals with customers who are "repeaters," and it is only necessary for him to hold his regular customers in order to be successful. In

and is directly responsible for many of the failures which occur among builders every year.

The war put such a powerful brake on the building machine that many builders were forced to shut down completely. Others, however, felt that they had given so many years of their life to establishing themselves in business that developed for "carrying on" during the war. Many of the schemes that were developed have proven so successful that their originators have retained them as a part of their business even in peace time. Thus they have assured themselves a steady income the year around and are not worried by visions of slack building seasons.





No. 1

No. 2

No. 1—This shows three of the units of the four truck fleet. Mr. Moorhead, standing, is shown directing the leading truck. No. 2—The pneumatic tired truck being prepared to receive an outing party. On account of the pneumatic tires this truck is chartered at five dollars per day above the price asked for the solid tired ones

the building game, however, the builder seldom deals twice with the same customer. One building is about all that the average man ever builds and after that is completed his value as a customer is gone. Of course he has a certain value as a booster for the builder, but insofar as his buying power is concerned he may be counted out.

In connection with this we are also acquainted with the fact that during certain periods of the year building is practically suspended on account of the weather, and that during abnormal years such as those of the late war, building becomes almost impossible. Competition among builders is always so keen that it is seldom possible for a builder to accummulate more than enough profits during the busy season to tide him over the slack periods, and when he counts up at the end of the year he often finds that he has made only enough to be able to get through the winter.

This is an unfortunate condition that deserves considerable study. It has existed for many years in this country it would be foolish to give in entirely. To many of these latter we are indebted for the large number of methods which were In devising a method for earning money on the side it is of course necessary to first determine the needs of the



This neat and appropriate stationery is printed in brown ink on light brown stock, and "Build Now" in red

community that is to be served. In some towns there is a need for a well equipped woodworking plant to turn out simple furniture. In another the plant should specialize in garden accessories—trellises, etc. In another it could supply simple millwork to other builders. Or, it may be that a town needs a builder who specializes on jobbing work. A

with no prospect of an early resumption of activity. His business was beginning to drift, so Mr. Moorhead decided to try a new tack and head into the wind.

After considerable deliberation and investigation he decided to buy a motor truck. He knew that a truck would be a valuable addition to his equipment and although at that time his volume of busi-

are several points of similarity in the operation of the two lines of business and he is not compelled to slight one for the other.

The value of the trucks in his own business may be readily seen. In transporting workmen and materials from one place to another the saving in time and money is considerable. In excavating



Blotters such as these are interest compelling and offer an inexpensive means of advertising your business. Consult your local printer as to cost

builder who employs a hand picked crew and is always prepared to lay a new floor, set a store front or do any of the numerous odd jobs that are floating around. In some communities a concrete block plant might prove to be a money maker. In others, a fleet of motor trucks might be the thing. It all depends on local conditions and the ingenuity of the puilder.

One of these ingenious builders is H. S. Moorhead of Pittsburgh, Pa. During the last year of the war Mr. Moorhead set himself to devise some method of ceeping busy. Building was stagnated,

ness did not really warrant a truck solely for his own use, he felt that he could justify its purchase by hiring it out when it was not employed on his own jobs.

That his judgment was sound is proven by the fact that although only a little more than a year has elapsed since he purchased his first truck he now owns a fleet of four and feels that his hauling business will constantly grow and require more and more machines. His success in the hauling business has not caused him to curtail any of his contracting business. In fact he says that they seem to grow together. There

work they are especially valuable and will readily do the work of 18 to 20 teams.

In building up his hauling business Mr. Moorhead has not confined himself to any one branch. He does hauling for other builders and for the general public, both in Pittsburgh and to the surrounding towns. His trucks are always on the go and are available either night or day for either short trips or long distance hauls. One attractive feature of the trucking business is that his customers are usually "repeaters"—his motto is "Once a customer, always satisfied."



A most attractive small church that is economical and easy to build. Note the entire absence of any cut stone work or any other expensive embellishments. H. S. Moorhead & Co., Builders. George Stoeffler, Architect

The fleet at present consists of four trucks; one 3½-ton truck, two 2-ton and one 1-ton truck. This gives a variety suitable for almost any purpose. The larger trucks are all rebuilt ones, each of which was bought from the factory at a price about one thousand dollars less than is asked for an entirely new truck. As they are factory rebuilt they are apparently as good as new ones as all important parts are entirely renewed and every part is put in first class condition before the truck is delivered.

One of the trucks is equipped with pneumatic tires. It is estimated that on country roads this feature saves a third of the time spent with a consequent saving in gasoline and in upkeep. This pneumatic tire truck is in great demand for outings, picnics, moonlight parties and so forth. It is also equipped with removable seats along the sides and presents quite a festive air when it is "dolled up" for such an occasion.

Another example of Mr. Moorhead's alertness is his employment of blotters to drum up new business. In this article the backs of several of his blotters are reproduced. Such attractive advertising as this is bound to bring results and as they are changed every few weeks there is no chance for them to become monotonous. They are mailed out to selected lists of possible customers and architects

and have been responsible for landing some nice jobs.

On one of the blotters will be noticed a building that was erected in 16 days. This building is of mill construction and is 50 by 150 ft. in size and 25 ft. high—some speed!

Another blotter shows a remodeled store front. This is a profitable line of work for a builder and even in small towns there is often a great deal of this sort of work that may be had for the asking.

To the enterprising builder this story is alive with suggestions for increasing and stabilizing his business. Of course, it is not to be expected that anyone can take Mr. Moorhead's methods and apply them directly in a community in which conditions are entirely different, but there are a world of other clever ideas that may be developed along the same lines as were employed in this case. Each community offers a separate problem and requires thorough investigation before a decision is made.

IMMIGRATION LAWS

The Executive Committee of the National Federation of Construction Industries, Drexel Building, Philadelphia, directs attention to the following:

A number of bills (S. 1472, H. R. 61, H. R. 563, H. R. 1107, H. R. 5645, etc.) have been introduced in both Houses

of the Congress, which, if passed in their present form, would stop all immigration for a period of years.

Among the elements which enter into consideration are the question of the exclusion of undesirable aliens; the question of a labor supply at all times adequate to serve the best interests of the country; the question of whether it would be the part of wisdom to effect a complete stoppage of immigration for a period of years and whether Congressional action should be made necessary to permit renewed immigration.

The whole subject of immigration is at this time admittedly one in which personal prejudice might result in great injury to the country. It would therefore be very helpful to the Directors if they could have your opinion on the following phases of this important matter:

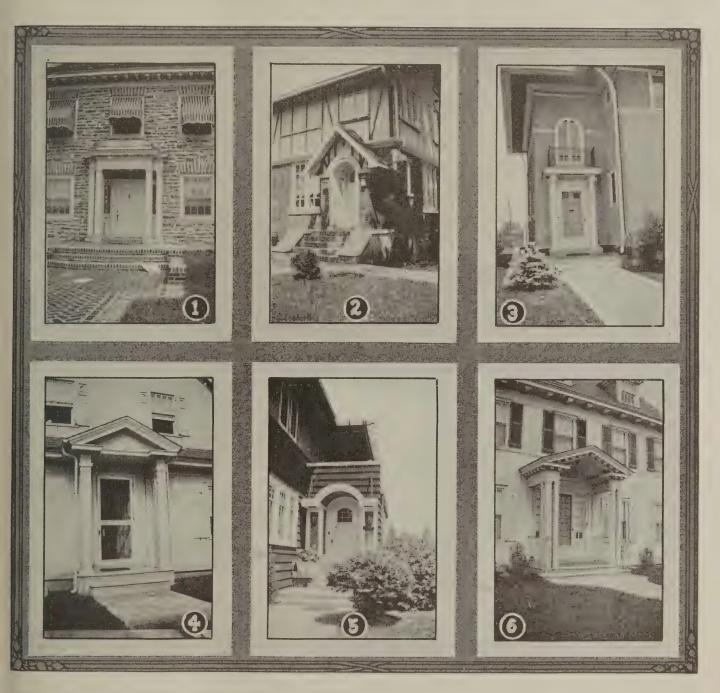
- 1. Do you believe that the present immigration laws, as amended at the last session of the Congress, with provision for stringent literacy tests, ought to be given an opportunity for trial before further legislation is enacted?
- 2. Do you feel that with the marked emigration of labor, which has been going on during the past few months, it would be desirable to amend existing legislation to eliminate, or make less stringent, literacy tests?
- 3. Do you feel that it would be desirable for legislation to be enacted which would stop all immigration for a period of three or four years?
- 4. Are you now experiencing a labor shortage, either skilled or unskilled?
- 5. Do you expect that you will have a shortage of labor in the near future?
- 6. Are you willing, without further solicitation to keep the Directors of the Federation advised from time to time as to labor conditions as they affect you, and as to any changes in your opinion bearing upon this subject?

LIME INVESTIGATIONS

A new plasticimeter, which is an instrument designed to determine the plasticity or spreading properties of lime, has been developed by the Bureau of Standards, Department of Commerce, Washington, D. C. This instrument simulates the action of the plasterer in spreading the material on the wall. Plasticity is the most important property of hydrated lime, and practically determines the commercial value of the material. Means are provided for measuring the effort which the plasterer must exert, and for varying at will the base upon which the plaster is spread, the time required, and the angle at which the trowel makes with the surface. The force required to spread the plaster in conjunction with the time during which this force acts, gives a measure of the plas-

ENTRANCES

These Suggestions, with those that Appear in these Pages from Time to Time, will Enable You to More Easily Design the Entrances for Your New Buildings



No. 1—A splendidly proportioned entrance in the Colonial type. The doorway is set in a recess which forms a shelter.

No. 2—An attractive entrance for the English type of house. This door is also recessed. The arch and jambs are of stone.

No. 3—When a stair landing occurs above the main door the stair window may often be combined with the entrance to form a pleasing composition.

No. 4—A Colonial entrance combined with a Germantown hood. All of the members are of wood except the tympanum which is of stucco to match the house

No. 5—An adaption of the modern English style. This combination of white woodwork and grey stucco is very effective for a house with stained clapboards.

No. 6—This Colonial entrance is almost large enough to be called a porch. This type is too elaborate for any except the more expensive houses.

Rental Charges on Equipment

Development of Standard Schedule of Costs for the Use of Equipment on Construction Work Proposed—Two Lists of Charges Made by Representative Firms Given as Examples—Suggestions and Criticisms Requested by the Associated General Contractors of America

THE problem of establishing fair and equitable charges for the rental of equipment on construction work looking toward the development of a standard schedule, involves first, a careful study of costs, and second, a consideration of general policies relating to the standardization, maintenance, and disposition of equipment.

The standardization of construction equipment makes practicable the establishment of a schedule of equipment rentals; while on the other hand the practice of purchasing new or special equipment for each job and either scrapping or disposing of it on the completion of work makes such a schedule unnecessary. The largest and most successful general contractors are, however, adopting a policy of returning all important standard plant and equipment no longer required on a particular piece of construction to a general or branch storehouse, where it is repaired and put into condition for the next job, and of charging a standard rental price for its use against each contract.

A Standard Schedule of Rental Charges

For the use of such equipment the Associated General Contractors of America has been asked to investigate proper rental charges and if possible to establish a standard equipment rental schedule. Such a schedule would be of great value in helping to standardize costs in making estimates if based on an analysis of costs and general practice in a large number of representative firms.

Rental Charges for General Equipment

The Information Bureau of the association therefore requests members to assist in this analysis (1) by informing the Secretary of the policy adopted by each in the purchase and standardization of plant and equipment and in their disposition on the completion of any job; and (2) by carefully examining the following schedules for equipment rentals and by making suggestions for changes or additions thereto which should be incorporated in any standard schedule established by the association. The two schedules given for general equipment have been submitted by two representative construction firms, members of the A. G. C., one an eastern and one a central western firm.

Rental and Other Charges for Contractor's Equipment

"Construction Equipment—The contractor will supply all construction equipment of every description for the proper handling of the work. For such construction plant or parts thereof as the contractor may own or furnish, rental will be charged at the rates mentioned below, and such construction equipment will be carried on the contractor's regular payrolls for this work and as a part thereof at these rates, or as otherwise specified below for each and every working day, also for Sundays and holidays, if used. In the event of the contractor's equipment being used for a longer period of time per day than the regular working day an additional pro rata charge of the scheduled rates will be made for such overtime as each item is used.

"The duration for which rental will be charged, except as otherwise provided below, is from the time Contractor's equipment is loaded on cars for shipment to the work, as shown by the shipping manifest, until Contractor's equipment is loaded again for return to the Contractor, unless other conditions are agreed to in writing, Sundays and holidays excepted, unless used.

"Charges for the use of such construction equipment as it is desirable or necessary for the Contractor to rent from outside sources will be made in accordance with the bills rendered by the suppliers of such equipment, together with all expenses in connection therewith for which the Contractor is liable.

"Repairs—Contractor's equipment will be shipped in good operative condition, and charges for ordinary replacement of parts or other repairs necessitated during the progress of the work will be billed at cost of such replacement or repairs. On rented equipment charges for repairs will be in accordance with the agreement with the owners of such equipment.

"Small Tools—Under this item are to be included all tools used, not scheduled below, including carts, wheelbarrows, shovels, picks, bars, wrenches, axes, drills, wire cables, ropes, rubber boots, and similar items, and a charge for the use of same will be made as a lump-sum equal to two and one-half per cent of the total amounts of the Contractor's payrolls for this work.

"Teams—All teams used for and on this work will be charged for and carried on the payrolls at the prevailing local

"Transportation—Trucking, freight, express and all other such items as may be incurred for the delivery to the work and reshipment back to the Contractor of all Contractor's equipment and all labor and expense in connection therewith, and for the putting together, setting in place and moving, together with the dismantling, moving and reloading of all items of Controctor's equipment for this work, will be billed in addition to the other charges mentioned above."

Rental Charges Per Day for Equipment as Mentioned in This Contract

Equipment List A Li	st B
Adding and listing machines, Burroughs No. 301 \$.30 \$.20
Adding and listing machines, special types at Special pr	rices
Automobile trucks and trailers Special pr	rices
Back filler, power driven	6.00
Boiler and 3-drum engine 6.00	4.50
Boiler and 2-drum engine 5.00	4.50
Boiler and 1-drum engine	2.50
Boiler only, 30 H. P. and smaller 2.50	1.50
Boiler only, 30 to 80 H. P. 4.00	2.50
Boring machine, pneumatic	.50
Boring machine, electric	.50
Bucket, tipple and bottom dump	.30
Bucket, orange peel, 34 and 1 yard 6.00	2.00
Bucket, orange peel, less than 34 yard 3.50	1.00
Bucket, clamshell, 1 yard	1.50
Cars, skip, 1½ yard	.25
Cars, skip, 3 yard	.50
Cars, steel, 1 yard and smaller	.15

Care wooden 4 yard	50	=0						
Cars, wooden, 6 yard.	1.50	.50	Sprinkling cart				2.00	1.50
Cars, wooden, 6 yard. Cars, wooden, 12 yards and larger.	Special	prices	Steam roller Steam shovels, revolving, tra	ction			10.00	10.00
Cars, 1 yard hopper, radial gate	50	.25	Tamps, compressed air, for the	ack			75	15.00
Compressor, 10x10, with steam engine	Special	prices 2.75	Transit				1 00	.50
Compressor, 8x8, belt driven engine	2.00	1.25	William Wi	7			30.00	15.00
Compressor, small, with gasoline engine of	1		Filels and lubricante not	includ	ad in 41-		.20	.20
wheels	5.00	4.00	- sets and rabileants not	merud	ea m tu	ese p	rices.	
wheels	10.00	6.00	Small Tools	and /	Annlina			
Compressor, Westinghouse, 91/2" single action	1 50	1.00	20010	anu z	тррпапс	es .		
Compressor, Westinghouse cross compound	. 3.00	2.00	For the use of small tools	and a	nnliance	0 *** 0	m h	-6 17-
Crusher only	4.00	.30 2.50	Building Construction Emp	lovers'	Associ	o, mc.	of Ch	or the
Crusher with elevator and screen	5.00	3.00	recognize the following:	10,010	2 1000001	ation	OI CI	neago
Cutter, bar portable, with motor	4.00	2.75				IIsoo	f Over-	
Derrick, 60 to 85 ft., wooden Derrick, 30 to 59 ft., wooden	2.50	2.00 1.50			Compen-	Tools	head Ex	
Derrick, less than 30 ft	1.50	1.00		117	sation and Liability	Appli-	pense and	
Derrick, breast	40	.30	Carponton Farian	Wages	Insurance	ances	Profit	Total
Derrick, circle swing		.30	Carpenter Foreman Carpenter Journeyman	\$1.25	.07	.00	.18	1.50
Derrick, steel, 80 to 90 ft	6.00	4.00	Carpenter Laborer	621/	2 .035	.105	.15	1.10
Drill, small air	75	7.50	Mason Foreman	1 25	07	.00	.18	1.50
Drill, steam	1.50	1.25	Mason Journeyman Mason Laborer	871/	.055	.10	.17	1.20
Drill, Duntley electric track drill, 550-volt	3.00	2.00	Laborer Foreman	85	.03	.045	.10	.75 1.00
Elevator, platform or bucket Elevator, with bins for concrete	50 75	.50	Mason Scaffold Builders			.00		1.00
Engine, skeleton, 3-drum	4.00	3.00	and Mortarman Shoring Foreman	65	.03	.12	.10	.90
Engine, skeleton, 2-drum	3.00	2.50	Snorers	. 621/	.11	.00	.14	1.25 .90
Engine, skeleton, 1-drum	2.00	1.50 2.00	Caisson Foreman	1.25	08	.00	.17	1.50
Engine, steam, upright, to 10 H. P.	1.00	.65	Caisson Diggers	77 ½		.12	.13	1.08
Engine, gasoline, to 8 H. P.	1.00	.65	Niggerheadmen	.70	.05	.10	.10	.95
Engine, gasoline, 10 H. P. Engine, derrick swinging	2.00	1.00 .75	Caisson Riggers and Laggers Iron Setter Foreman, Struct	1 25	.06 .25	.12	.17	1.25
Engine, 2-drum with electric motor	7.00	4.00	Iron Setter Jour'yman, Struct.	871/	.12	.13	.20 .17	1.70 1.30
Excavator, Keystone No. 3	30.00	15.00	Iron Setter Form'n, Orna Iron Setter Journeyman, Orna.	1.25	.095	.00	.15	1.50
Ford automobiles and light 4-cylinder cars Hammers, riveting	5.00 50	3.00 .50	Hoisting Engineer	871/	.06 .05	.15 .16	.14 .16	1.15 1.25
Hood elevating machine, hand power.	2.00	.75	Hoisting Engineer.			.10	.10	1.40
Leveling instrument, engineers'	.50	.30	Derrick Work	.87½		.185	.17	1.35
_ocomotive, standard gauge, saddle tank	Special .	5.00	Steamfitter Journeyman	.871/2	.05 .0375	.00	.20 .18	1.50 1.25
vilxers, with boiler and side loader	7.00	5.00	Steamfitter Helper	45	.0375	.10	.11	.70
Vixers, with electric motor, to 1 yard	5.00	3.50	Plumber Foreman	1 25	.05	.00	.20	1.50
dixers, without boiler, less than 1 vard	3.50	2.00	Plumber Journeyman Plumber Laborer	571/2	0375	.15	.18 .18	1.25 .90
vixers, without boiler, I vard and larger	5.00	3.50	Gas Fitter	.871/2	0.375	.15	.18	.90
Mixers, with gasoline engine, 11 to 15 ft. cap	4.00 2.50	3.00 2.00	Drain Layer	.683/4	.0375	.15	.15	1.05
40torcycle	2.00	1.00	Painter Journeyman	.75		.00	.18 .15	1.15 1.05
Aotors, 2 H. P	.30	.20	Decorator Foreman	1.00	.07	.00	.18	1.25
10tors, 10 H. P.	.75 1.00	.40 .70	Decorator Journeyman Comp. Roofer Foreman	1.00		.10	.10	1.10
10tors, 25 H. P	2.00	1.50	Comp. Rooter Journeyman	771/	0	.00 .09	.18	1.25 1.05
fotors, 50 H. P	4.00	3.00	Tile and Slate Roofer Forem'n	1.20	.07	.00	.23	1.50
the hammers, steam, up to 2.500 lbs	4.50	2.00 3.75	Tile & Slate Roofer Journey'n Tile & Slate Roofer Helper	.80 .65	es des	.18 .12	.20	1.25
'ile hammers, steam, larger than 2.500 lbs	7.00	5.50	Sheet Metal Foreman	1.20		.00	.16 .23	1.00
'umps, Centrifugal, 10", belt driven	5.00	2.50	Sheet Metal JourneymanSheet Metal Laborer	.80	0.00	.20	.20	1.25
'umps, Centrifugal, 10", with motor att	4.00	4.00 3.00	Sheet Metal Glazier	.05 771/		.13 .20	.17 .20	1.00
umps, Centrifugal, 6", steam connected	3.00	2.25	Cement Finisher Foreman	1 10	m Am	.00	.18	1.35
umps, Centrifugal, 4", steam connectedumps, duplex and triplex, to 3"	2.00 1.00	1.50	Cement Finisher Journeyman Cement Finisher Helper	.80		.08	.12	1.05
umps, triplex and belt drive	.50	.50 .50	Plasterer Foreman	.625		.05	.11	.85
umps, Pulsometer, to 4"	1.00	.60	Plasterer Journeyman	.871/2		.00	.00	1.50 1.20
umps, Pulsometer, 4½" and larger umps, with gasoline engine	2.00	1.00	Plasterer Laborer	.621/2	.00	.00	.00	.90
umps, diaphragm	.50	.30	Lather Journeyman Pipe Coverer Foreman	1.81½		.00	.00	1.20
umps, diaphragm, with gasoline engine	1.50	1.00	Pipe Coverer Journeyman	811/4		14	.21 .21	1.50
ail, per ton	.12 1.50	.08 1.00	Pipe Coverer Helper	.50	.03	12	.20	.85
lie Cabinets, with fillers	.50	.30	Stack Lining Electrical Foreman	1.25		14 00	.21	1.20
w benches, plain benches, plain, with motor or gas engine	.50	.50	Electrical Journeyman	871/		143/4	.20	1.50 1.25
attached	1.00	1.00	Stone Cutters Foreman	1.00	.02	26	.22	1.50
'w table, railway cut off, no power	2.50	2.50	Stone Cutters Journeyman Stone Cutters Laborers	.571/2		26 04½	.16 .10	1.25 .75
tw, automatic feed, no power	1.00	1.00	Waterproofing	.80	.02 .	105		1.05
.lw, Elliot wood worker, with motor	.50 2.50	.50 2.50	Concrete Foreman Time Keeper	1.25		00	.18	1.50
w, band, for iron, no power	7.50	7.50	Concrete Laborer	.57½		00 09	.08	.75 .80
Sale boxes	.50 .50	.50 .50	Tuckpointers and Extension Wall Cleaners				4.0	
		,,,,		.87 ½	.21 .0	045	.12	1.25

What Will You Do In Dull Times?

By William Robinson Safford

"COME on, Joe, let's go fishing"—and that's the way a couple of contractors solved their spare time period when business was dull. A very good way it is to pass the time, too, snugly



Plate A—A profitable business can be built up by contractors, over-coating old houses with cement plaster. Either wood or metal lathing is used and the material is usually put on in three coats. The illustration shows the "scratch" coat, ready for the final coat

tucked away on lake or stream deftly hooking a big one now and then, far from the cares of labor.

Unfortunately, however, the children don't stop eating in dull times nor does the wife quit buying clothes. The rent runs right along and the ice man and milk man bring in just as many bills when your business is dull as they do when it is brisk. So the man who goes fishing must have a little nest egg laid aside when he goes away, otherwise, he may find the bills piled up so high when he gets back that the delightful memories of his trip are lost in added worry upon his return.

Most every business has a dull time every year, a time when work is hard to get. Every man needs a vacation every year and the time to take his vacation is when business is light. But most men can take but a couple of week's rest. The balance of the time they must be on the job, and they are the ones hardest hit

when the period of business stagnation exceeds the period of rest they can afford to take. After the fishing trip, if business is still dull—what then?

Many contractors fail to remember that their business is not very different from any other, except in details. Take, for instance, the hardware dealer. If he is up-to-date he tries his best to stimulate business at all times, but more particularly at times when business is dull. How does he stimulate it? By bargain sales; by unusual window displays and by advertising. He offers particular features to attract custom at the time when much of his trade falls off because of the vacation period.

The idea in dull times is to put out extra exertion to attract new customers and in order to keep your men busy and your organization intact through a period of scanty business you can well afford to offer special inducements for new customers.

The summer season is usually the busiest for the builder but as summer days grow shorter and fall approaches the business of building declines in most towns. The contractor who has built up his organization to take care of a brisk business in the spring must lay his men off unless he can drag in more business.

One of the most successful businessbuilders for the contractor in dull times is repair work. There is usually plenty of it, though most house owners carelessly put off their repairs. These indifferent householders it is up to the wideawake contractor to educate. They should learn the well known fact that "repairs each year are much less dear."

Repair work is the most profitable work that can be undertaken by any contractor.

About mid-summer, just before the fall and winter decline in work is the time for the ambitious builder to get out after repair work. He should advertise in local papers, reminding customers that this is the best period in the year to fix up their buildings for the winter. An ad along these lines follows:

REPAIRS TO YOUR BUILDINGS

Do it Now; Save Money This Month

To keep my men busy I will quote you special prices on repair work; good until December 1st.

J. F. BAILEY, Repair Expert 114 Abbott Block

We do everything in woodwork, brickwork, stonework and metalwork.

We do honest work—Yes, we do.

Phone 96



Plate B—Contractors should be right on the job just as soon as the Fire Department goes home. In this case the fire required only a hand extinguisher, but there was a hole in the roof to patch. That means a job for the builder

Here is another one designed to pull in new customers:

BARGAIN SALE IN STORM WINDOWS

To keep our mill running we are making special prices this month. Costs you nothing for estimates.

> HENRY K. HANSON, Storm Window Craftsman Winter Storm Sash Summer Screens 1119 Providence Court

You will find it comparatively easy to build up a good repair business. All you require is a systematic way of going after new work. Get the jobs and then take care of them. Make it a point to give good service and you'll just naturally get the same customers back again year after year.

When Mrs. Willy Nilly calls up and says that the railing on her front porch needs fixing she is usually in a hurry. Probably she has put it off until the last minute and now she wants it fixed quickly before the painters get there. Get right after it and you will make a friend of Mrs. W. N.

If someone calls up and tells you about a leak in the gutter, get right up the same day if possible. It may be only a two-dollar job but your prompt and good service this time may get you a \$100 job next time.

A good way to keep tab on the repairs needed in any town is to examine houses and note those which require the services of a carpenter, tin-smith or mason. Then get right after the owners and try to get their business. If you walk down one street and see a roof that needs shingling go see the owner and try and interest him in a new roof of asphalt or aspestos shingles. Show him samples and tell him about its advantages.

If you are a painting contractor, go to the owner of some house that needs your services and submit a color scheme and orices.

Every owner wants his property kept in good shape. Most folks have too much pride to let it run down and learly everyone knows what false economy it is. Usually when a place needs epairing it is because the owner has not hought of it. He has failed to notice hat something is wearing out and needs ixing up in order to save more expensive repairs later.

It is a good idea to keep track of all our old customers, those for whom you ave done repair work as well as those or whom you have built new houses. Ince a year you can send out printed ostal cards to remind them that your

annual repair-bargain time is near. Something like this is the way these postals usually read:

To

My dear.....

As an old, and we trust loyal customer of ours, we take the liberty of informing you that, in our opinion, the following repairs on your property would seem necessary at this time in order to prevent any further damage to your building:

We can do this work for you now more cheaply than at any other time in the year.

Faithfully yours, Contractors and Builders. it a point to keep in touch with painters. House owners often first discover that their buildings need repairing when they call in the painters and in this way the painters get a chance to recommend the services of a reliable builder.

Painting contractors can keep in touch with buildings that need painting in the same way—that is, by examining buildings in their own or other communities and then visiting the owners with a view to getting the job. A system of post cards mailed out annually by painters to former customers usually yield good results.

In addition to the repairing of roofs and gutters there are many other repairs required so that any repair specialist can



Plate C—Asbestos shingles are popular and profitable for the contractor who can pick up a valuable side-line re-shingling old roofs. Asphalt shingles are also profitable—to the owner as well as the builder. Are you getting any of this new business?

Some contractors who have discovered the profit to be found in repairing make

build up a good business for dull times if he goes right out and gets it. For



Plate D—The silo business is a good one for any builder blessed with an automobile. Why not get the agency for a good silo system in your county? Wood silos like these come knocked-down and are easy to construct

houses where the old wooden steps have rotted contractors should advocate new cement steps. Old wooden railings on top of bay windows can be torn away. Cornices, with "ginger-bread work" can be remodeled and old fence posts rebuilt. Repair specialists should always



Plate E—During dull times the wise builder can pick up profitable country business building cement silos for the farmers. A system of metal forms can be purchased from manufacturers and it is then merely a proposition of labor and material

with cement plaster has come to be an extensive business for soldiers. As most contractors know, metal or wood lathing is applied directly to the old siding after new outside casings have been applied to all exterior door and window frames. In dull times builders can go right out after new work along this line.

Then there is the business to be had by plumbers and steam fitters, putting modern plumbing and heating into old houses, to say nothing of electric wiring, desirable business for electrical contractors. In the country there is a brisk demand for electric lighting plants and many country houses are now equipping with acetylene or gasoline gas plants. Water supply systems and septic sewage systems are also in great demand in the country and there is no reason why any contractor should not build up a specialty in this line.

Silos will be found a profitable side line for contractors who live near country districts and have automobiles with which to reach the farmers. Wooden silos as well as the more permanent ones of concrete, brick and hollow tile must be built by someone—why not you, Mr. Contractor?

Increasing the size of your business to take care of the falling off in dull times is, after all, a merely ordinary problem such as confronts any merchant. A little thought expended on this problem fol-



Plate F—Mason contractors can specialize in hollow tile silos and keep their bricklayers busy in off seasons by taking contracts to erect them. It's a pretty business and a profitable one. Why not go after some of this work when your regular work slackens?

recommend the best and most durable form of construction for the repairs. If an old wooden fence needs rebuilding, recommend that the new one be built with all joints "weathered" and set in white lead. Owners are not slow to see the point and when a man honestly recommends something that will reduce repairs in the future, that man is going to stand well in the owner's opinion.

The over-coating of old frame houses

lowed up with a moderate amount of exertion is bound to make your business more profitable. Try it.

PAINT AND KEEP YOUR CREDIT GOOD

Here is a line of talk that the builder can use in connection with his suggestions for repairs, etc., to his customers:

A prominent banker makes the statement that he is influenced in lending money to people by the appearance of their property. If their houses, barns, and other buildings are kept in repair and painted as often as necessary in order to give them a spick and span appearance, he feels that they are a better risk than those who do not paint their buildings and let them go to rack and ruin through neglect.

It is a condition in almost all moregages on buildings that the buildings shall be insured, for the protection of the lender, against fire. Some lenders make the stipulation also that the buildings shall be kept painted at regular intervals. This is a wise precaution, as a building can deteriorate from lack of paint so as to lose a large part of its value in just a few years. In a way, paint is also fire protection, since it is the slow combustion of the oxygen and other elements in the air that causes the decay of building material.

Besides, if for any reason it is desired to sell a property, the prospective purchaser can easily be induced to pay a higher price for a well-painted house than for a shabby one. A good buyer looking over a shabby property is quick to assume that the owner is bankrupt or badly in need of money if his property has a run-down appearance, and makes his offer accordingly. If it is neatly painted, however, he assumes that the owner is prosperous and hesitates to make an under-value bid. In short, in case of a sale, a coat of paint will bring a price for a house enough higher than could be obtained for an unpainted building to more than cover the cost of painting.

Therefore, any way we look at it, paint is a good investment for an owner.

SILO WALLS MUST BE AIR AND WATER TIGHT

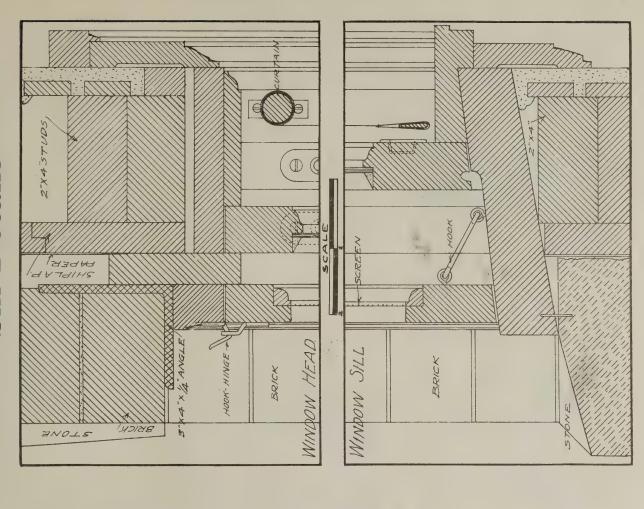
To keep silage in good condition the air must be shut out and the moisture retained. The silo walls, therefore, should be both air and water tight. All other farm buildings require a certain amount of care and repair and so does the silo. By painting the wooden stave silo on the outside with a good grade of paint and using some preservative such as creosote on the inside, the wood should last many years, remain water-proof and in good condition, according to A. C. Ragsdale, of the University of Missouri College of Agriculture.

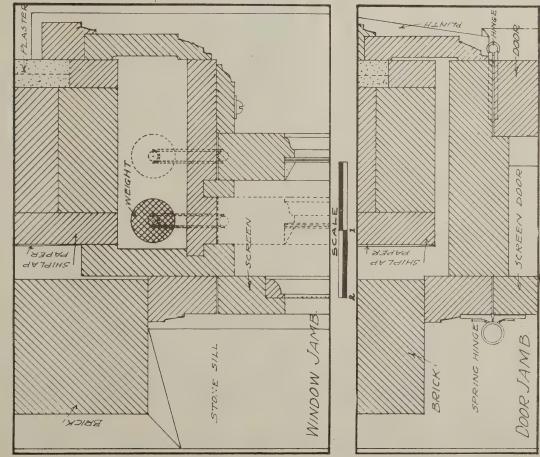
The interiors of all concrete silos require waterproofing with a cement wash or some waterproofing compound at the time of construction and usually every few years afterward. This fills up the pores, sealing the wall so that it will be air tight. One of the cheapest methods of waterproofing the silo is simply to use a creamy paste of cement applied over the entire inside surface, with a whitewash brush.

Window Head and Window Sill Details Window Jamband Door Jamb Details

Jamib Details

By Chas. E. Rawson





For Idle Hands

THE average builder who confines himself exclusively to the construction of buildings, is usually hard put to keep things going during dull seasons.



No. 1—An arbor trellis forming a frame for a garden gate. It is secured to the walk by means of iron straps and expansion bolts

Just at the time when he has built up a smooth running machine that can make money for him he runs into a slump in building and his carefully selected workmen must be laid off and his organization broken up.

This costs both time and money, because when his next job comes along he finds that it is impossible to obtain the services of many of his former workmen. He must begin all over again to get an efficient crew together, and about the time he gets to going good, work drops off and he must again lay off his crew.

The skilled mechanic is of such importance in the success of every builder that much time and effort have lately been expended in an attempt to devise means to keep him at work in one organization the year around. In order to do this it is usually necessary for the builder to branch out into some sort of sideline that will offer an outlet for his men's work during several months out of each year.

One way of doing this is to utilize your woodworking machinery and build small novelties during the dull periods. Almost every community is alive with

possibilities along this line and there is a potential market in every town for a large variety of articles that any skilled mechanic is capable of making.

The average mechanic prides himself on his handiwork and is never so content as when he is building something that requires him to exercise his ingenuity and skill. He likes to build things that may be examined closely so that his cleverness may be appreciated. It is usually an easy matter to interest him in any scheme that offers him an opportunity to show himself.

Arbor trellises and other garden furnishings find a ready sale all over the country. They are comparatively easy to build and require only a small in-



No. 2—This will make a very attractive feature of the yard when the vines grow around it. Almost anyone would be glad to have something like this on their place

vestment for their manufacture. Every house owner who has a yard is a prospective customer and a builder needs to sell only a few of them in order to create a demand that will keep his force of men busy a large portion of the time.

Many builders make arrangements with their local furniture dealer or department store to place their product on the market. The furniture dealer either buying the pieces outright or selling them on a commission basis. Other builders do their own marketing, selling direct to the consumer.

The builder's product may either be built to the order of a buyer or the

builder may use his own judgment and build various articles that he feels will find a ready market. Either plan is good, but the latter is especially desirable as he can build enough pieces during dull times to supply the demand when his men are engaged on other work. By the special order method it is usually necessary to hold up the order until there is an opportunity to execute it and this often results in a lost sale. A combination of the two methods often works out well. If a buyer wants a made to order piece at a time when the workmen are busy he can usually be interested in a similar article that is carried in stock.

The matter of local pride should be of great value in assuring the success of an enterprise of this kind. We are all more or less prejudiced in favor of our home town, and the builder who engages in this sort of work should be quick to seize every opportunity to impress upon his town folk that his product is of local manufacture and made by local mechanics.

The "hand-made" feature is also a strong argument in favor of articles of this sort. To be able to say that a thing is hand-made gives it an immediate prestige in the minds of most people. The very fact that a thing is hand-made makes it seem more personal and immediately suggests something different.



No. 3—A very pleasing composition formed of an arbor trellis and a seat. A thing of this sort often adds dollars to the apparent value of a home

The individual quality also makes a good talking point. The prospective customer should be made to feel that he is getting something different from anything that his neighbor can obtain. He should be impressed with the fact that his own ideas and tastes can be incorporated into the article and that



No. 4—An arbor trellis on the way to the rear of the house. It seems to naturally belong in the picture just as much as does the tree which stands beside it

here is an opportunity for him to express himself. Women are especially proud of "personal" things and are never so happy as when they possess something that differs from those owned by the neighbors.

In work of this sort, where there is such a great duplication of sizes and shapes, it is necessary that the shop be fully equipped with woodworking machinery and other devices for turning out materials in a hurry. The articles must be kept low in price and as there is a great amount of hand work involved even at the best, the work must be simplified wherever possible. A well equipped plant will do away with a great deal of the tedious work and will thereby aid in keeping the mechanic's interest at top notch. If the workmen are not kept interested in work of this kind they will soon spend so much time and effort on an article that it will be impossible to sell it without loss to the builder.

Some builders turn over the shop to their workmen during dull periods and allow them to make and sell their own products. This, of course, apparently does not make any money for the builder but it serves the purpose of keeping the men together. In some shops this scheme has developed into a sort of co-operative society in which each man makes about what he pleases and the entire product is sold by the organization, the builder looking after the general success of the whole and perhaps working at the bench with the men.

In other shops the men are paid by the hour just as they are on regular work and the builder says what is to be done and takes care of the selling end. Which method is to be employed is a matter for each organization to decide for itself.

One most important feature is the matter of design of the pieces. They must be neat and graceful and must be built to withstand the weather. Extremely complicated articles are not desirable as they run into too much money

and are not likely to stand up well. Lumber should be well seasoned and free from any rot. Joints that hold water should be avoided wherever possible. Portions of posts and other members that are in contact with earth should be creosoted. Do not allow creosote to get on places that are to be painted as



No. 6—A pergola forming a bower around the French doors of a living room. There is a lot of practical value as well as beauty in a sun shade of this kind

it will discolor paint. Posts set in concrete are more substantial than those driven into the ground.

The accompanying illustrations are full of suggestions for designing work of this kind and should have considerable value as references.

THE JOB YOU DID LAST YEAR

When you are called upon to do a job of repairing similar to one that you more or less clearly remember doing a year or more ago, if you depend on your memory it is likely that you will have forgotten the name of the customer you did the job for and so you cannot find the records that you wish to compare the present job with.

A system used by some contractors in taking care of such records that they will be of easy reference is modeled on that of architects who file their papers by the character of the work to which they relate

To make this plan of filing more definite a letter index as a subfile for the customer's name can be added to the subject index.

How do you take care of your records, Mr. Contractor?



No. 5—A combination of brick and wood that borders closely on the pergola type.

The seats add to the looks and the usefulness of the whole

THE POPULAR SMALL HOUSE

THE modern tendency apparently leans toward the small house. Each year we seem to be building our homes smaller and smaller. No doubt this is in part due to the relative economy in building a small house. But we must look further to find the principal reason.

People with ample means to afford homes of any size are putting up small ones. Many who have no reason to economize are selling their large houses and building more compact ones. They are tired of the endless dusting and cleaning that a large house requires. Tired of taking twenty steps to accomplish what can be done in two.

The servant problem also enters here. Families who were accustomed to having three servants now find it difficult to obtain one. Women who employed one maid are now doing their own work—and, incidentally, they enjoy doing it. The war has emphasized the dignity of labor. It has become fashionable to work!

Women who have been accustomed to every labor saving device in their large houses demand the same conveniences

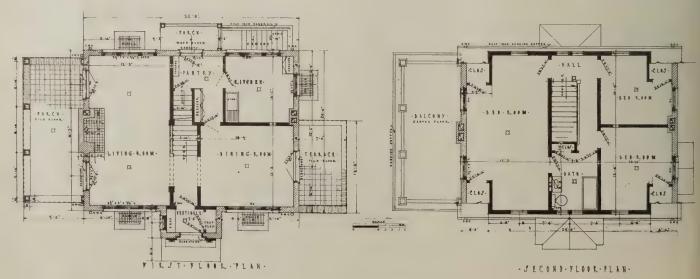


No. 1—The Dutch Colonial is a very suitable type for a small house like this. Large houses in this style seldom look well



· F R O N T · E L E V · A T I O N ·

-JIDE · ELEVATION ·





No. 2—The modern English type of house is growing in popularity in this country.

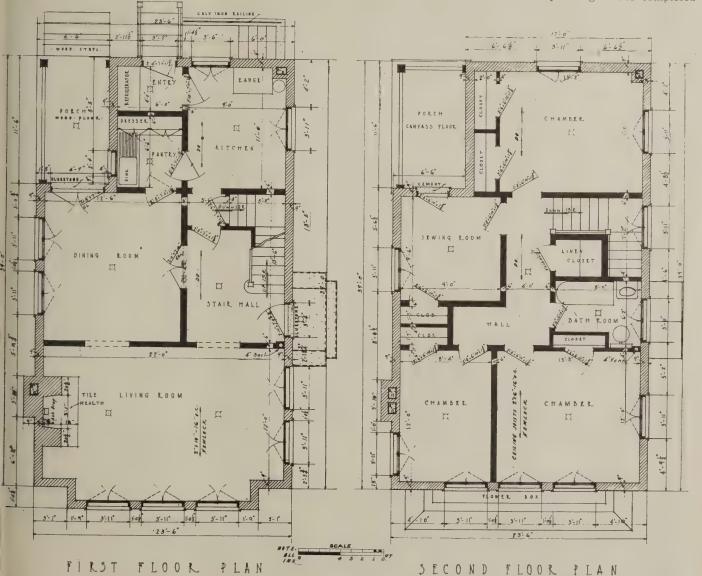
They have a homey feeling that is very desirable

in their smaller homes. They may intend to do their own housework, but they insist on doing it in the simplest and easiest manner. They will not be contented with an inconvenient plan nor with a slipshod installation of equipment.

Further, these people demand that their smaller home shall be just as good to look at as their larger one was. Their small home must be wholly practical and convenient, but it must not be ugly nor freakish.

Three of the houses illustrated in this story are members of a group of a dozen or more that were built in Bethlehem. Pennsylvania, by Howard J. Wiegner, architect, for Harold T. Magee. They are clever examples of the possibilities of building small houses that are both practical and convenient and at the same time fulfill the requirement of an attractive appearance.

The fourth house shows what can be done in the way of remodeling an old, out-of-date building so that it has every appearance of a new house. There is no indication of patching in the completed

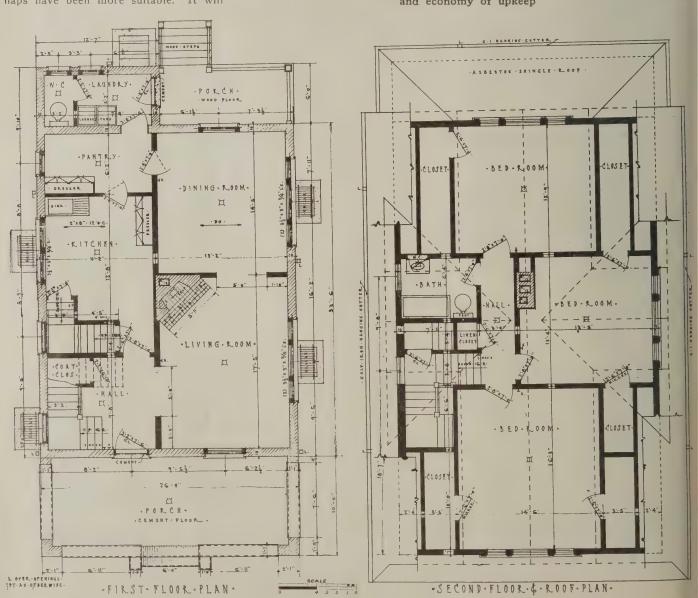


building and one who is not acquainted with its history would have no reason to consider it to be anything but an entirely new house.

House No. 1 is located on a corner lot and is a very attractive example of the Dutch Colonial type of house. The walls are laid up in cherry red brick with wide white joints to match the white trim. The wood shingles of the gambrel roof and the dormer are stained. The well designed balustrade along the edge of the living porch deck relieves any appearance of severity at this point, and the flower boxes and shutters are small details that add considerably to the effect of the whole. It will be noted that the entrance detail has been changed from that which is indicated on the drawing. A simple arbor trellis has been substituted for the more elaborate detail of the original design. Simplicity is of course desirable, but it is somewhat apparent that it has been carried a little too far in this case. The more carefully studied detail of the original drawing would perhaps have been more suitable. It will



No. 3—Stucco, slate and brick form a combination that is hard to beat for durability and economy of upkeep





Before During

No. 4—It is difficult for the untrained to see the possibilities in an old house. These photographs are an object lesson that could be shown to the skeptical with good effect

also be noted that the stucco finish shown on the original drawing for the dormer has been replaced by shingles. This makes a more pleasing treatment. Too many materials in one composition create a fussy appearance.

The first floor plan of this house is very compact and well arranged. The projecting vestibule takes no space from the house proper and is equipped with a seat and coat closet. The stair hall is so combined with the living room that its small size is not apparent. It would probably be desirable in most cases to have French doors in the opening between the hall and dining room to give the latter more privacy.

The living room has French doors opening into the living porch and in the completed building the latter was glazed for all the year use. The dining room also has French doors leading to the terrace.

The pantry serves a double purpose. It is both pantry and rear entry. This is a very clever arrangement that might be used more often. It would even be possible to have a door into the living com from the pantry if desired. The citchen has cross ventilation and an abundance of light.

The second floor contains three bed coms and a bath. All of the bed rooms have cross ventilation and plenty of closet space. The large bed room across one end of the house is very desirable in ome cases. The windows opening from his room onto the balcony could be eplaced by French doors to good adantage.

The two doors into the bath room would be considered objectionable by ome people. A rearrangement of this nd of the hall would do away with this eature.

This house is worthy of considerable study both for its excellence of plan and its attractive appearance.

House No. 2 is modeled along modern English lines and is an attractive example of its type. The walls are of cherry red brick laid up in white mortar. The roofs are of wide slate and the wood trim is painted white. The trellises and placing French doors in the opening between living room and hall the latter can be entirely shut off from the other rooms.

The living room is large and well lighted and opens directly into the dining room. The latter has French doors opening onto the side porch which might be used as a breakfast porch in fine weather.



After

the ornamental ends of the verge boards relieve the house of any of its severity. There is a flower box above the hood on the street front. The entrance is at the side under the small open porch. This gives a rather unusual plan that is often quite desirable.

The front hall is considerably larger than in the preceding example and by

The pantry and rear entry are compact and well arranged and the front door is easily reached from the kitchen.

The second floor contains three bed rooms, a bath and a sewing room. All of the rooms have cross ventilation and large closets. The bath is compact, but not unduly crowded and is easily reached from the bed rooms. The linen closet

is exceptionally large and its ample size is appreciated by the housekeeper.

The sewing room is another feature that makes a hit with the woman who does considerable sewing, and its closet makes a convenient place for keeping unfinished garments. The porch opening off of the sewing room is almost large enough for a sleeping porch, and in a pinch both it and the sewing room could be utilized for sleeping purposes.

House No. 3 cannot be said to belong to any particular style. Its gambrel roof and the gable windows are suggestive of Colonial work, but taken as a whole it may be called a modern type of American house.

The full length front porch is rather a novelty these days when almost everyone demands a porch that is glazed for year around use and placed at the side to give more privacy. There is still some

demand for the old-fashioned open porch, however, and this is, of course, a matter for the owner to decide for himself

The front hall in this case is placed in one corner and opens directly into the kitchen and the living room. The living room and the dining room are connected by a wide cased opening.

The laundry is placed on the first floor instead of in the basement. This arrangement is becoming quite popular in some localities, as it is considered by many women to be more convenient. The laundry also serves as a rear entry and there is a water closet at one end. The necessity of passing through the pantry in order to reach the kitchen from the rear door would be frowned on by many housekeepers. The lack of cross ventilation in the kitchen would also be bad in the estimation of many. Note that the

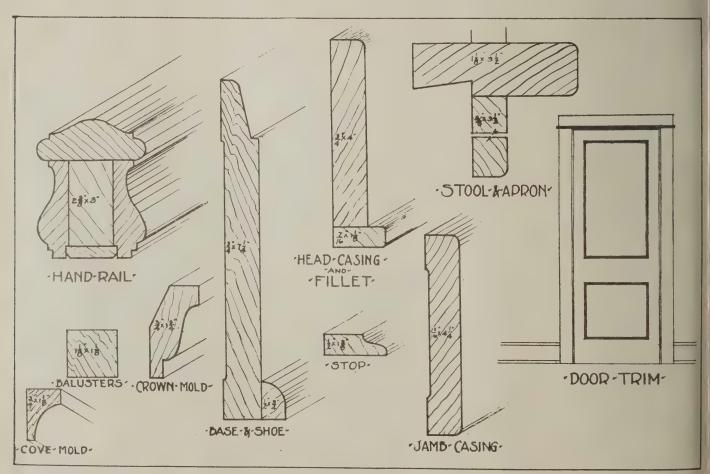
stair is a combination one that allows one to go upstairs from the kitchen without passing into the front of the house. The coat closet under the stair in the front hall is a desirable feature.

The bed rooms of this house are somewhat larger than those of the preceding houses, but none of these have cross ventilation and are therefore not so desirable. The closets are unusually large and the bath room is conveniently located with respect to the bed rooms.

House No. 4 is a remodeled one that has been handled in a highly successful manner. It is purely Colonial in feeling and is a splendid example of the possibilities of changing the entire appearance of an old house. Plans of this house are not available and in fact are not considered necessary as every job of this kind offers its own particular problem and has no general application.

Interior Trim

Courtesy of Buckeye Building and Realty Co., Mansfield, Ohio



Simplicity in details—an absence of that fussy ornamentation that was so much admired in past days—is the order of the day now, and the wise builder, who would earn the housekeeper's good will must govern himself accordingly

Low Cost Houses for Sale

N building small houses for sale, one of the principal requirements is economy. In these days of high prices and shortage of labor it is more difficult than ever before to keep a building within

profits in order to get rid of it or he must hold it at a constantly increasing loss.

In order to build inexpensive houses the builder must first select a simple, in the front porches and a few other minor changes.

Although their use of the same plan causes the houses to group together and adds to their harmony there is no effect



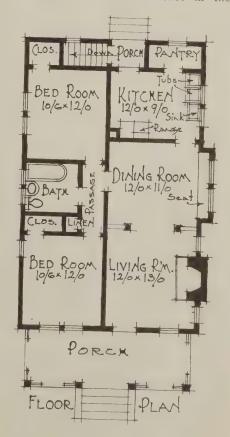
he means of the purchaser. A little nnecessary work here and a little rasted effort there soon puts a building eyond the means of the average man, nd the builder must either sacrifice his

BASEMENT 21/0×21/0 UNEXCAVATED straightforward plan. A plan that is practicable for the class of people who are to be served and one that is easy to build. Plans that are made up of a large number of jogs and breaks and those that are more or less complicated are not desirable. Neither are those that contain a large number of fancy details either outside or in.

In building houses of this kind, the materials entering into the construction must be suited to the grade of work. It is foolish to put the very highest grade of workmanship and materials into a house that is intended to sell at a low price. This doesn't mean that the work is to be unduly slighted nor that the materials are to be shoddy. It simply means that good, durable materials should be used and that they should be put together in a substantial manner, without any fuss or frills.

The average man of limited means who is buying a home is not greatly concerned with hardwood finish and expensive details. What he wants is a substantial house that will stay put for a reasonable length of time. One with a simple, compact plan that keeps his wife's housework down to the minimum and yet gives them enough room to live decently.

The two houses shown in the illustrations are splendid examples of attractive low-cost houses. Both have the same plan with the exception of the difference of sameness about them. This, of course, is chiefly due to the fact that in one case white clapboards are used for siding while in the other stained shingles are employed. The difference in the



porches also helps in this respect. Note the almost entire absence of detailing on these houses. The rafter ends are left exposed and take the place of a more expensive cornice. The porch detail is simple, but is rendered highly effective by the clever use of lattice work. The steps are made of wood instead of concrete, thus making another saving.

The use of native stone for the foundations of both houses and for the chimney and around the porch of the house in the foreground is also a factor in keeping down the cost. Where stone is plentiful it is usually more economical to use this material than to make the walls of concrete.

In the basement plan it will be noticed that only a portion of the earth has been removed. As the laundry tubs are placed in the kitchen and the only space required in the basement is for the heating plant and for a moderate-sized storage place, this method is entirely practicable and saves that much money. There is a 6x8 inch built-up girder supported on chestnut posts down the mid-

dle of the basement to carry the floor joists and partitions above. The basement stair is of wood and contained within the walls of the building. This is a less expensive method than to build a bulkhead with concrete or stone steps.

The floor plan is simplicity itself. The living room is apparently small, but as there is only a colonnade between it and the dining room, these two rooms have the appearance of one. It should be noted here that the colonnade treatment is almost out of date, but in a case of this kind it may have some justification, although wide French doors give the same "open" feeling and yet insure more privacy.

The bay window and seat at one end of the dining room are not strictly necessary, but they form an attractive feature that adds but slightly to the cost—we must have some butter with our crust!

The kitchen is ample in size even though it also serves as the laundry. By opening the rear door good ventilation is obtained. The pantry makes a convenient storage space for foodstuffs and

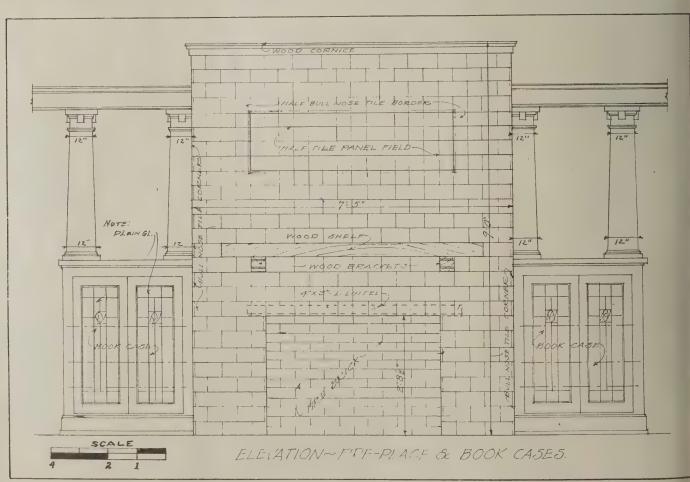
for utensils that are seldom used. The rear porch could be made somewhat larger by taking some space from the pantry.

The bed rooms are of good size and contain large closets. It is necessary to pass through the living room and the dining room in order to reach the passage which leads to the bed rooms, but in a small house with few people passing back and forth this should not be objectionable.

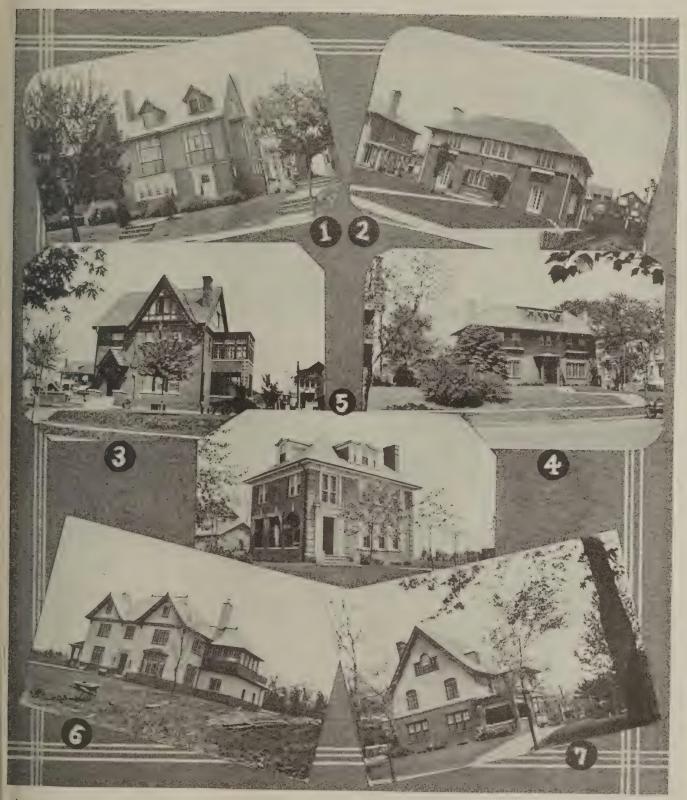
The bath room is amply large and is conveniently located. A linen closet also opens from the passage.

These houses were designed and built by John J. Rorick, of Stamford, Conn. Mr. Rorick says that one feature of his work which contributes to his success in building houses at a low cost is due to the fact that he buys standard materials in large quantities. By doing this he not only saves money on the cost of the materials, but also saves time on the job, as his work is seldom held up on account of delayed shipments.

Details of Fireplace and Bookcases



St. Louis, Mo., Homes



A rather daring but entirely successu combination of materials. The lower try is brick with white trim. The upe story stucco with black trim.

Brick below with a stucco halfty. A good example of a simple deis that is full of character. Note the fictiveness of the flower-boxes. 3. A house along English lines, but with the addition of the characteristically American sleeping-porch. The half-timber in the gable is well placed.

4. Gray stucco and dark trim. A house that depends almost entirely on the placing of the windows for its effect.

5. A brick house with wooden trim-

mings. The entrance is through the porch to the living room.

6. Pure white stucco with stone trimmings. The belt around the sleeping porch at the side is of slate.

7. Brick and stucco again. Stained wood trim and slate roof. The gable is excellently proportioned.

Forty Years A Builder

FORTY years' service in the building game would seem to earn a rest for a man, but P. J. Eifler, builder, of Kenosha, Wis., says that he has just started. He says that the most restful place for him is "on the job," and that to sit around and do nothing except "boss" has no attractions for him.

The accompanying photograph wasn't posed. The photographer caught Mr. Eifler unexpectedly when he turned around to see what the guy with the camera was about. Mr. Eifler is the figure in the foreground and although the photograph is not clear it answers the purpose of showing how he digs in instead of telling someone else how to do it.

The trusses are being arranged preparatory for raising into position. They are of 50-ft. span and belong to the so-called lattice type. Mr. Eifler has used this type of truss for years and says that it has no superior for carrying long span roofs over garages and so forth.



The trusses are built-up of small members and they are light, strong and economical. Any good mechanic can frame

one without difficulty, and they do not require a large crew nor an expensive apparatus to hoist them into position.

The Builder and the Housewife

As THE TIME is fast approaching when nearly everybody must wait on himself or herself, the builder is assuming all the importance in the mind of the housewife that was formerly held by the costumer.

Housewives today are constantly discussing the merits of their economically arranged and convenient apartments, and the many labor-saving devices which reduce work, save steps, and tend to make the burdens of housekeeping pleasurable. In these discussions we may be sure that the name of the builder who knows how to satisfy these critics is not forgotten.

The desire for a home where there are open spaces; where the sun can shine on at least three sides of the house during the day; and where there is space for a flower garden, and space where the lettuce, radishes, sweet corn, tomatoes, and even the ubiquitous potato may be grown, to reduce expenses and increase health—this desire is ever present. Then, Mr. Builder, talk in the terms of this desire, and not in the terms of lumber, and bricks, hollow tile, cement and mortar.

Point out to your customer that no matter how well arranged a house may be, it can always be improved by the addition of a front piazza, or veranda, and a rear service porch, if built in the form of a bungalow. In this type of building a dry space for storage in an attic is practicable and a cellar under a

portion or all of the building, reached by the addition of a stairway, may be made to accommodate the winter heating apparatus, as well as the summer auxiliary gas heater, and also give additional storage space.

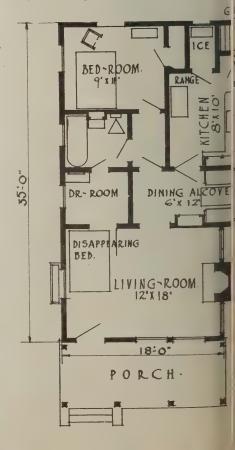
Economical planning in the design of modern apartments has resulted in supplying new devices, equipment and furniture, which take the place of the cumbersome out-of-date things of the past. Built-in bookcases, buffets, cupboards and linen closets, breakfast alcoves, window seats and disappearing beds, make up the equipment of an apartment where space is well utilized.

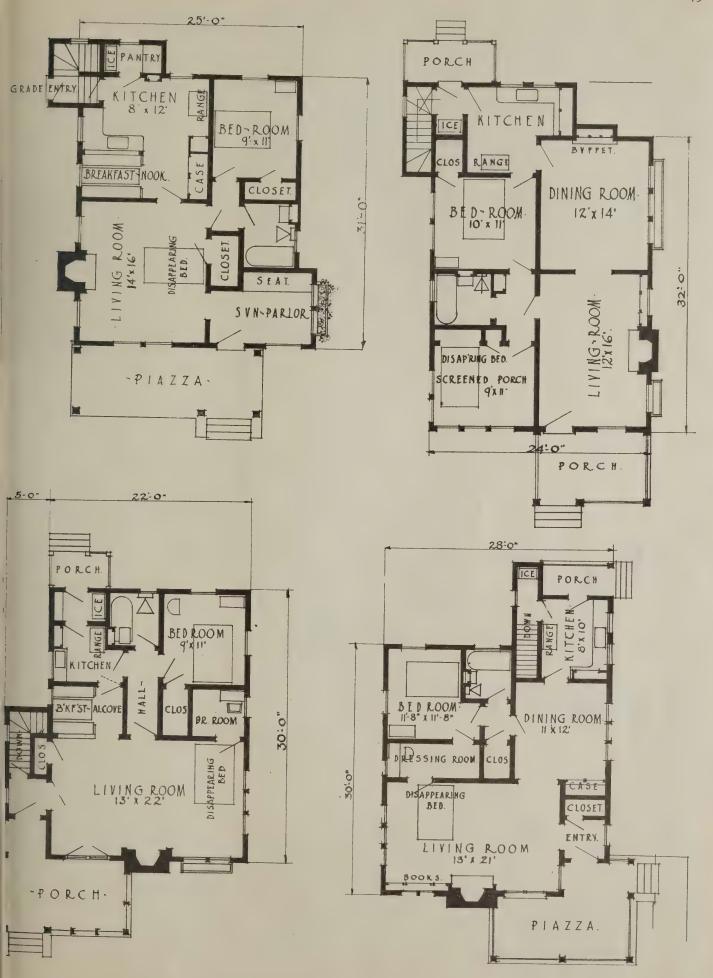
Do not forget that refrigeration is of growing importance and get the mind of your customers on their views regarding outside icing or the installation of an icing machine in the basement and piped to the pantry refrigerator.

The accompanying plans, which are of varied character, show combinations in the use of some of the modern space-saving equipment and furniture to which people have become accustomed in apartments and which they feel are necessary. If utilized in the economical planning of a bungalow not only may space be saved, but cost reduced. The purchase of fewer pieces is necessary in furnishing a home, and this is often an encouragement to young home owners.

The bungalow plans shown here have all been directly developed from modern

apartment arrangements and if economically constructed those structures may be erected, exclusive of cost of lot, for practically the same figure as would be represented by the sum total of rent receipts for a period of five or six years.





Single-Flat Store Buildings

IN some localities the small store building with a single flat above is quite popular. The two buildings illustrated are located in Milwaukee, Wisconsin, and are attractive examples of this type of building.

By including his living quarters in the same building with his business, the merchant obtains a convenient arrangement and also saves the extra cost of building a house on a lot separate from the store. In some cases he does live in a separate house and rents the apartment over his store.

Fig. 1 is a frame building with stained siding and white trim. The arrangement of the living apartment is similar to that of an ordinary story and a half house, as it contains sleeping quarters in the attic space. The hood across the front is effective in indicating the separation between the store and the living quarters. In this case it would probably have been possible to have had the entrance to the living quarters at the side of the building instead of in the front, this would have given more show-win-



area one-story portion. The small balcony and the bay window are practical remedies for that shut-in feeling that some of these buildings have. The hood across the front is supported on wooden



dow space. The flower box under the living room windows adds a home feeling that is sometimes lacking in a building of this character. The dormer would perhaps have been better for a somewhat more simple treatment, it is a trifle too conspicuous.

Fig. 2 is a brick design with wood and stone trimmings. This is a true flat with all of the living portion on one floor. The two-story portion extends only a part of the way back, as all of the space is not required for the apartment. The back porch is formed on this

brackets and is covered with a Spanish tile roof.

BUILDING CODES

In a recent address before the Indiana Builders' Supply Association, Virgil G. Marani offered an analysis of the conditions under which building codes are created and adjudged that is of interest to all builders.

It is perfectly evident, said Mr. Marani, that safe and sane building regulations, which are consistent and which

favor no particular material or special type of construction, if properly enforced, will do much to encourage healthy competition and better building.

There is sufficient information at hand, from existing codes, and the inadequacy of most of them, to enable a diagnosis about as follows:

1. The writers of building codes are in many cases not informed upon the construction and use of many materials for which they frame governing laws.

2. Often (only too often) Commissioners appointed to frame building laws are politically appointed, politically controlled, and naturally under the influence of many inexplicable political ramifications.

3. "Appeal Boards" are usually under the same disadvantages though they should also be entirely out of politics and should be appointed from a list of names submitted by the local organizations representing the Architectural, Engineering, Builders and Real Estate interests of the community.

4. Building Codes are too voluminous, they should cover only such requirements as are the "minimum" possible for safety and health. A small code all enforced, alike to everyone is better than a voluminous code from 25 to 50 per cent enforced.

5. In the allowable use of materials for all types of construction and for "fireproofing," such materials should be placed on a merit basis, i. e., should be required to conform to certain specified strength and fire resistive requirements. If materials are mentioned by name (as is usually done), the "maximum" kind and nature of materials which can be used should be allowed, instead of mentioning a few favored products, and admitting others, or not, as the case may be, under the vague, uncertain, and much used term "or other approved materials and construction."

6 Contrary to present tendencies, the more general construction of fireproof buildings should be encouraged by admitting the greater use of many types of construction and materials, which now are allowed in many codes under certain penalties and restrictions. In many portions of "fireproof" buildings incombustible materials serve the purpose as well as so-called fireproof materials, and are cheaper.

7. Since 99 per cent of the buildings built per year in the states are not fire-proof, building codes should give more attention to the proper construction of this type of structure. At present practically 75 per cent of any code governs the construction and materials entering into fireproof construction.

8. Buildings should be classified according to the degree of protection of their construction against the action of

fire, which might be somewhat as follows:

"Full protection signifying what we know as fire-proof."

"Partial protection signifying what we know as semi-fireproof."

"Temporary protection signifying what we know as slow burning, and applying particularly to the frame structure properly designed and protected."

There is no reason for unnecessary delay or expense in the writing of building codes because practically all the information needed regarding use and strength of materials can be obtained from any of the national organizations interested in these lines of activity. The organizations referred to which furnish information of this character free of cost are the following:

American Society for Testing Maerials.

United States Bureau of Standards. National Board of Fire Underwriters. Underwriters' Laboratories.

American Institute of Architects.

American Society of Civil Engineers.
American Society of Mechanical Enpineers, and many of the leading techical institutions throughout the country.

METRIC SYSTEM WOULD BE SIMPLER FOR BUILDER

The passing of Andrew Carnegie rings to mind the fact that he had been or years an ardent advocate of world andardization in weights and measures trough the adoption of metric units.

Andrew Carnegie was a member of the letric Committee of the National Amican Association of Manufacturers, hich strongly urged metric standardization. At the time the committee met, he add the following statement:

"The metric system of weights and leasures is one of the steps forward that the Anglo-Saxon race is bound to take soner or later. Our present weights ad measures, inherited from Britain, are tworthy an intelligent nation today. The advantage America possesses over litain in the decimal dollar system as compared with their pounds, shillings ad pence would be fully equalled by the apption of a metric system of weights ad measures."

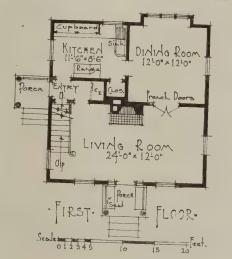
Carnegie believed that world standalization of weights and measures wild aid greatly not only the cause of wrld trade, but also that of world pace. On another occasion he said: "he old weights and measures are a licredit to us. We shall inevitably appt meter-liter-gram, if for no other teson than as an aid to peace; but by would enormously aid our world trade."

A Small Colonial House



A HOUSE that will bear inspection when it is first completed may be depended on to retain its pleasing appearance as long as it stands. Much of the charm of old Colonial houses is due to their surroundings and to the softening effect of age.

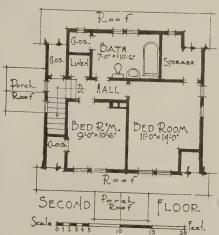
The house illustrated is pleasing from the very first and although small it has a certain quiet dignity that is usually found only in larger houses. The feeling of the exterior design is Colonial, but the plan is not of that style as it does not contain the large central hall that is characteristic of the old work. This only goes to show that in modern



Colonial work it is not necessary to exactly follow precedent in order to successfully combine a given style with a different type of plan.

In many modern Colonial houses the true spirit of the style has been sacrificed in an effort to attain mere prettiness. No amount of "looks" in a house will repay the housewife for the extra

steps made necessary by a poorly planned house. This plan is compact; has a convenient arrangement; good circulation and is a thoroughly livable



small home. It is only twenty-five feet square, yet it contains five rooms, a bath and six good-sized closets—we all know what these latter mean to the woman of the house

This house is located in Wisconsin and was designed and built by R. H. Sporleder.

BETTER FOREMEN

For those who are interested in the development of better foremen on construction, there is now in the course of preparation in the Department of Labor, Washington, D. C., a document dealing exclusively with hints and helpful suggestions to foremen which will soon be available.

At the present time there is available in the same department more than a dozen pamphlets on shop and contract management problems which will be sent to anyone on request.

The Little Home for the Auto

By William Robinson Safford

LMOST every home now has a garage, and some of these are attached to the house, while others are out in the yard adjacent to the street, alley or

and he gets a much more convenient building.

Many contractors are making a specialty of garages, building several types

are slightly smaller and for two small cars 18 by 18 feet will do, but most owners prefer a little more room.

Many garages are now built without



Initial stages

driveway. The first garages built a few years ago when "buzz wagons" came into being and owners were brave enough to drive them were more like barns than garages. Most of them were too large, especially as to height, frequently being eleven or twelve feet in the clear on the that are economical, convenient and good-looking. An owner who needs a garage often sees one somewhere that just suits him and he gets his contractor to build one just like it. Contractors can build up a considerable garage business in this way and it is nice, clean

Filling the runners

any upper story. A flat roof is used, covered with prepared roofing, pitched slightly toward the four sides to carry off the water. A galvanized hanging gutter can be employed with two down spouts. These little buildings look well in the yard; often they are given a sort





Getting there

first floor, with rooms above and a steep

High cost of garages, like high cost of everything else, has tended to reduce these necessary buildings in size, which is really a good thing for the owner because unnecessary expense is eliminated, work because your customers are usually good, substantial people to do business

The regulation, modern garage for two cars is about 20 by 20 feet and it need not be more than 8 ft. 10 in. high in the clear on the first floor. Some garages

The brickwork is up

of garden character by using lattice work on the sides, and planting vines.

Of course, a brick or hollow tile garage is more desirable than a frame garage and with the present high cost of lumber there is not a great deal of difference in price. I have recently seen a





Ready for the door

Complete

garage built with an 8-inch brick wall which cost slightly less than a frame garage of the same size. Hollow tile, also, can now be used for 8-inch walls at a cost no greater than frame—at least, in towns not too far from a hollow-tile factory.

Contractors will find in going after garage business than the masonry garages are the most popular. After building one or two of them they are practically sure to get more orders. To please most owners no finish is necessary inside. In the case of a brick garage, simply point the inside of the wall neatly, and wash it down upon completion. Sometimes pointing in colored mortar, inside, makes it particularly attractive.

Many garages are now built with no foundation walls. Simply build the cement floor, with 8 inches of cinders underneath, and then build the walls on top of the floor. This acts practically like a huge sidewalk, and any tendency the frost may have to displace the building is usually offset by the porosity of the cinders underneath. Sidewalks stand well in this way and it has now been found practical for garages, and appeals to owners because it reduces the cost.

Most owners want the ceiling sheathed inside and narrow yellow pine sheathing is usually used, varnished one or two coats. As a rule a plaster ceiling costs more and is liable to crack later.

In building the floor (when no foundations are to be used) contractors must be careful not to joint the floor. With a jointed floor it has been found the weight of the walls standing on the floor causes it to crack in the joints.

A simple, economical and well-built garage includes the big doors all across one end, which can be sliding doors or swinging doors. There are many excellent kinds of special hardware for garage doors and the contractor should send for catalogs and secure prices. The most frequent practice is to swing the doors outward (when hinged doors are used) as this method takes up no space in the garage.

In a convenient garage you will also find an iron slop sink with a hose faucet above and there is a cast-iron garage drain in the center of the floor, connected with a sewer or dry-well by means of a tile pipe. This drain should be large and readily cleanable or it will soon stop up with grease. The best way is to build a catch-basin in the center of the garage

floor and let the dirt, gravel and grease washed off the car run into the catch basin first, in which it is deposited. The iron cover on the catch basin can be removed for cleaning out the gravel when necessary.' This prevents stopping up the sewer with gravel and grease.

In a two-car garage the floor drain is put in the center of one of the "stalls." The electric light should always be hung over the center of the aisle between the two cars. If you hang it over the center of a stall the light falls on top of the car where you don't need it.

There should be a wall plug raised off the floor where it can't get wet from the hose, for plugging in a trouble-lamp.

Very few owners care for a pit. Most owners have their car overhauled at a public garage and no pit is necessary. Many owners, however, prefer their own gas tank and pump, so contractors who have no cars of their own should familiarize themselves with the many patterns on the market.

To save the cost of a wide cement driveway extending from the garage to the street many owners prefer "runners' with grass or gravel between. These are usually 2 feet wide and placed far enough apart to center the wheels of the automobile.

National Builder is made to supply the wants of the builder as a medium for the interchange of views on all matters that concern the builder. Plans and illustrations of buildings and construction work are shown with credit to the responsible builders and architects. To these all requests for detailed plans are referred as National Builder does not sell books or plans or cater to the general public.

The Round Barn

Comparing the Merits of the Round and Rectangular Types of Barn Construction

THE purpose of this article is not to advocate the use of the round barn to the exclusion of the more familiar University of Illinois, Urbana, Ill., and represent ideas that have proven their practical value by actual use. Much of round barns, the following answers re-

answer to letters written to all men who were known to own or to have built



Round barns at the University of Illinois.—Barn No. 1 is 60 feet in diameter. The cows run loose in the first story. A silo is in the center. No. 2 is a 60-foot horse, tool and hay barn, a small corn crib is located in the center. The remainder of the first floor is used for the storage of tools. No. 3 is 70 feet in diameter. The cows are in stanchions. A monolithic concrete silo is in the center

rectangular type. Rather, the intention is to present the advantages of the round type in such a manner that those who are interested in the erection of barns may weigh the merits and demerits of each particular type and judge the respective values to their own satisfaction.

The dollars and cents value of farm buildings in this country is so great that any builder, who neglects to weigh the worth of one particular type of construction against another, is not doing justice to himself nor his client. Farm buildings are built to serve certain requirements that are peculiar to each individual problem, and it is not possible to devise any single plan or method of construction that will be universally satisfactory and appropriate. In solving an individual problem, however, it is possible to make use of the conclusions arrived at by other men who have worked along similar lines.

Primarily the builder is concerned with the type of construction to be employed, while the farmer is concerned with the suitability of the building to his practical needs. Of course the interests of one are (or should be) the interests of the other, but each has his own particular element of the problem for which he feels individually responsible.

The accompanying photographs and drawings illustrate numerous plans and methods of construction used in building barns. They were prepared by the Agricultural Experiment Station of the

the data included in this article was also gathered by the station.

Cost of Carpenter Work

The most important enemy of the round barn is its novelty. In the minds of most builders, circular objects always imply more complicated and expensive framing than rectangular ones do. In the case of round barns, however, experience seems to show that this conclusion is more apparent than real. In



frame barn with vertical siding. drive through makes the silo easy to charge

garding the relative cost of the carpenter work were received by the Station:

- 1. "As to labor, one can build a circular barn much cheaper, because anyone that can use a hammer and saw can work on a circular barn. All heavy timbers, as sills, purline plates, etc., are nailed together one inch at a time."
- 2. "The carpenter work on a round barn 50 feet in diameter containing 1,964 square feet of floor space with 18-foot posts costs \$150, while the carpenter work on a rectangular barn 30x45 feet containing 1,944 square feet of floor space with 18-foot posts costs \$140. In both cases the work was figured at 30 cents per hour."
- 3. "From bids that I received for the carpenter work on the rectangular barn and round barn covering the same floor space, it was about \$75 cheaper for the round barn."
- 4. "The cost of carpenter work on a round barn is practically the same as a rectangular one of the same size if you have one carpenter of experience."
- 5. "In my opinion there should be no difference to speak of in the amount of labor needed to construct round and rectangular barns of the same capacity. I believe that carpenters who have had some experience in circular construction would erect the circular barn cheaper than the rectangular."
- 6. "It is my belief that the carpenter work required in building a round barn would be about the same as that of build-





Plate A

Plate B

Plate A—A round dairy barn and ice house on a farm where certified milk is produced. Plate B—A substantial, well proportioned round barn, with the first story built of brick



Plate C

Plate D

Plate C—Round calf and horse barns on the same farm as the barn shown in Plate A and built in the same manner. Plate D—A solid concrete barn with a dormer for taking in hay





Plate E

Plate F

Plate E—A well-proportioned dairy barn sixty feet in diameter. The first story is built of vitrified tile blocks. Plate F
—A finely proportioned dairy barn with an abundance of light

ing a rectangular one of the same capacity."

7. "I think the carpenter work would cost as much on a round as a rectangular barn, but the lumber does not cost as much."

8. "Our experience, though limited, has been that the round building will cost from one-fourth to one-third more for the labor of construction than a rectangular building containing an equal cubic space."

9. "If a good carpenter had plans to follow, I do not see why he should have any trouble in building a round barn, and believe the cost of labor would be less on a large round barn than on a rectangular barn of same capacity."

10. "I built a barn 40x60 feet containing 2,400 square feet with 18-foot posts, the carpenter work costing \$250. The next year I built a round barn 60 feet in diameter containing 2,826 square feet with 20-foot posts and the carpenter work cost me \$240. The round barn contained 15 per cent more floor area and the carpenter bill was 4 per cent less."

11. "When I wanted to build my barn I had a bill of lumber made out for a 40x80-foot barn containing 3,200 square feet of floor space and the lumber dealer wanted \$1,500 for the lumber. Then I had a bill made out for a round barn 72 feet in diameter containing 4,069 square feet of floor space and the lumber was an even \$1,000, which was quite a difference, so I built the round barn. The carpenter wanted the same price for his labor on the round as the rectangular barn."

12. "In reference to the comparative cost of the carpenter work in erecting round and rectangular barns, I long ago found that it was a whole lot easier to build a round barn than a rectangular

same length applied to a rectangular building. This makes for a saving in material. Another saving in material is gained from the fact that due to the principle of the arch and hoop used in the construction of round barns, a much stronger wall can be built with less material. Thus, where the studs for a rectangular barn must be set 16 inches on centers, the studs for a circular wall are usually placed from two feet to two feet six inches apart.

The accompanying table was prepared by an experienced barn builder and offers definite proof that there is a considerable saving in the cost of the material required for a round barn as compared to the rectangular type. The material costs upon which the table is based were true for central Illinois in 1916. To obtain a fine relation these prices should of course be revised to conform to costs prevailing at the present time. The proportional costs, however, hold good for any place and at any time and as a basis for cost comparison they are as valuable today as when they were tabulated. It will be noted that the table presents

these is the relative quantity of material which has just been discussed.

The mechanical principle also is better as the round-barn type takes advantage of the highly efficient system of the arch and hoop. This, as already noted, gives a stronger wall with lighter construction. Studs may be placed farther apart and the construction is lighter throughout.

The members are all built-up of small pieces. With the exception of the floor joists no pieces larger than 2x8 inches are required.

If the siding is put on horizontally and a hip roof is built, no scaffolding is required. The workmen use the hoops and so forth to stand on.

Wind pressure against a curved surface amounts to only about two-thirds of that assumed for corresponding flat surfaces. Because of its barrel-like construction a round barn may safely be built higher than a rectangular barn having a similar floor area.

The possibility of having the silo in the center of the round barn is of great advantage. With the cows in a circle

COMPARISON OF COST OF MATERIAL IN ROUND AND RECTANGULAR BARNS OF THE SAME AREA AND WITH 20-FOOT POSTS: NOT INCLUDING FOUNDATION AND SILOS

Materials	Round barn 60 feet in diameter	Rectangular barn Plank frame	Mortise frame
Framing lumber Sheathing, siding, and flooring Shingles Bolts	13,976 ft. @ \$33 = \$461.20 12,971 ft. @ \$35 = 453.98 44,000 ft. @ \$ 4.50 = 198.00	19,833 ft. @ \$33 =\$654.49 15,355 ft. @ \$35 = 537.43 45,000 ft. @ \$ 4.50= 202.50 20.88	29,074 ft. @ \$33 == \$959.44 15,355 ft. @ \$35 = 537.43 45,000 ft. @ \$ 4.50= 202.50
Total cost of lumber Proportional cost Content, cubic feet	\$1,113.18 100 %	\$1,415.30 127%	\$1,699.47 153%
Materials	Round barn 90 feet in diameter	Rectangular barn 36x78½ feet Plank frame	Mortise frame
Framing lumber Sheathing, siding, and flooring Shingles Bolts	30,899 ft. @ \$33 =\$1,019.67 22,375 ft. @ \$35 = 783.13 97,000 ft. @ \$4.50 = 435.50	38,815 ft. @ \$33 = \$1,280.89 28,547 ft. @ \$35 = 999.15 102,000 ft. @ \$ 4.50 = 459.00 26.76	59,481 ft. @ \$33 = \$1,962.87 28,547 ft. @ \$35 = 999.15 102,000 ft. @ \$ 4.50 = 459.00
Total cost of lumber	\$2,238.30 100%	\$2,765.80 124%	\$3,421.62 153%

one of the same relative dimensions. I would say about 10 per cent less cost for carpenter work on the round barn, especially where the carpenters have had some experience with circular construction."

From the foregoing comments it would seem fair to assume that the carpenter work on round barns costs less than it does on rectangular barns containing the same capacity. This being especially true in cases where the carpenter foreman has had some experience in this type of work. It will be noted that out of twelve replies, only two say that the carpenter work costs more for the round barn than for the rectangular type, four say the cost is the same and six say it costs less.

Cost of Material

It is a well known fact that the circle encloses more area than does any other geometrical figure having the same length of boundry line. That is, a circular wall of a given length will enclose a larger building than will a wall of the

data for two sizes of round barns, compared with rectangular plank frame barns having similar areas and capacities. In all cases the walls are assumed to be 20 feet in height and no figures for foundations and silos are included:

Referring to the table shows that the difference in cost of materials between round barns and rectangular ones of similar size ranges from 24 per cent to 53 per cent with the advantage in favor of the round type. The 60-foot round barn has 1881/2 lineal feet of wall and the corresponding rectangular barn has 225 feet, making a difference of 22 per cent in the length of the walls and their foundations. The 90-foot round barn has a hay mow capacity that is 33,000 cubic feet in excess of the capacity of the rectangular barn with which it is compared. The length of wall required for the 90-foot barn is almost one-third less than that for the rectangular type.

Advantages of the Round Barn

There are several features which favor round-barn construction. Chief among

facing the center the feeding begins at the chute down which the silage is thrown and is continued around the circle, ending with the silage cart in its first position at the mouth of the chute. The same principle applies in feeding hay and grain and in cleaning out the manure.

On modern livestock farms where a large amount of mow room is desired for the storage of hay, the round barn is of particular advantage. There is often enough extra space in the mow to store the straw also, so that the waste and labor of bedding down the stock is reduced. The entirely unobstructed mow space of the round barn also lessens the labor of handling hay and straw.

The ventilating flues are placed in the center next to the silo. They take up little space either in the stable or in the mow and are highly efficient because their great height and freedom from bends creates a strong suction. In many cases hay and silage chutes are used as ventilating flues.

Disadvantages of the Round Barn

Additions to round barns cannot be ade so readily as they can to recngular ones.

Round barns are more difficult to light. his difficulty may be largely overcome placing closely spaced windows well toward the ceiling. In barns more an ninety feet in diameter it will be

necessary to make special provisions for admitting light to the center.

Specially designed hay tracks are required, but the hay carrier may run on a circular track midway between the silo and the outside wall and the hay is handled with less labor.

When stock is turned out of doors the round barn does not afford such an efficient shelter from the wind as the rectangular one does. This disadvantage can be overcome by building a high board fence radiating from the barn and forming a wind break.

The silo is not so easily charged as when it is located outside the barn. By building a runway to the mow space the wagons may be driven close beside the silo and easily unloaded into it.

For the Rural Builder

T the present time much attention is being given to modern developments farm buildings and their equipment. he rural builder who attains a reputaon for keeping abreast of the times with spect to his knowledge of the latest nd most scientific ways of doing things ls a great advantage over his competiirs. The mere fact that a builder hows how to build a better chicken op than his competitors can put up, eans little in itself, but the very fact tat he does the small things well often nlocks the door of opportunity to the lrger and more important works.

The accompanying illustrations are approduced from designs worked out by

the Agricultural Department of the University of Wisconsin, Madison, Wisconsin. This organization keeps in intimate touch with the needs of the people whom it serves and in most cases its designs are worked up from suggestions offered by practical farmers.

The following general observations on the housing of poultry are made by the department:

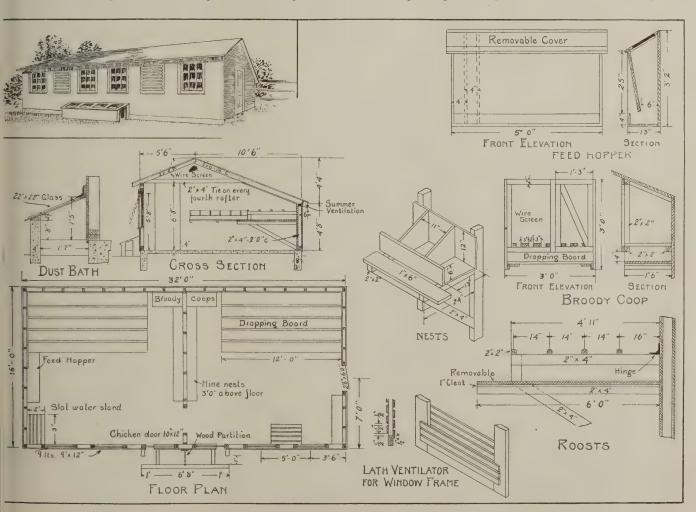
A farm poultry house which is both convenient and permanent can be built at low cost. The farm flock needs a dry, well lighted and well ventilated house if it is to be healthy and profitable.

It is advisable to construct a two-pen house. The pullets need to be kept away from the hens in the fall and the breeding flock from the general flock in the spring.

A farm poultry house which has many of these advantages, and which meets the requirements of the average farm is described and shown in this article. This house is 16x32 ft. and should accommodate 125 hens and pullets. It is often possible to reduce the cost by the use of second-hand windows or other materials.

Convenience an Important Feature

The interior fixtures of a farm poultry house, the roosts, dropping boards and nests, should be simple, convenient, and readily removed to make cleaning easy.



It is best to allow four square feet of floor space for each hen, and six inches of roost space for the small hens and ten inches for the hens of the larger breeds.

The windows should be built so that they can be opened and closed, according to weather conditions. The poultry house can be constructed so as to allow the entrance of plenty of fresh air without a draught and so as to avoid sudden changes of temperature. Lath ventilators (see the drawing) can be easily constructed and provide good air circulation.

To give plenty of light and air allow one square foot of glass to every 14 to 18 square feet of floor space and one square foot of ventilation space to each 20 to 30 square feet of floor space. Have the perches higher than the tops of the nests or make tops slanting so that the hens cannot roost on the nests.

The brood coop has a slat bottom with a dropping board below. This makes it self cleaning. The level of the floor inside of the house should be ten inches above the ground. Concrete or gravel makes a good floor.

Following is a bill of lumber for the building:

TWO-INCH STUFF

No	o. of Dim	en-	Board
piq	eces sion	as Length	feet
Rafters	26 2"x 6	5" 12'	312
Studs and misc 3			200
Roost, ties, headers 1	19 2"x 4	l" 12'	152
Rafter and studs	19 2"x 4	l" 14"	177
Studs and plate 2	25 '2"× 4		267
Miscellaneous	6 2"x 2	?" 12 '	24
		-	
/T / 1			1 1 2 2

ONE-INCH STUFF

Shiplap—dropping boards and inside wall	1"x12" 1"x 6" 1"x 6"	12' 10' 10' 10' 12'	700 660 60 20 18 640
Total		2	,098
FINISHING	LUME	BER	
Corner boards	1"x 4" 1"x 4" 1"x 6" 1"x 6" 1"x 4" 1"x12" 1"x 2"	12' 14' 12' 14' 14' 10' 12'	10 12 7 5 60 14

Six window frames for 9 light 9"x12" window Four windows, 9 light, 9"x12". Four windows with 22"x22" glass. One bundle lath.

Flat Wall Paint—Its Nature and Use

By A. Ashmun Kelly

T is important, first of all, to understand what flat wall paint is. Flat wall paints are all made on the same fundamental formula. They are made from lithopone and zinc white, with or without inert pigment, and with the common pigments used in coloring paints. The liquid part is China wood oil, a varnish-like substance that dries out with a dead or flat effect. This peculiarity renders its use in ordinary varnish undesirable, though otherwise it would be a great improver of most varnishes. In addition there is added the necessary amount of benzine driers.

Lithopone

What is lithopone? It is made from the metal zinc or spelter and barytes. The two are chemically manipulated and combined, and while the description of the process would prove very interesting to some, we shall omit it here. Briefly, the union of the two substances is such as to produce a new product, lithopone. This is then ground in wood oil.

No paint has ever received more criticism than this one. Many painters object very strongly to using it. Others give it a good character. Probably it is less understood than any other paint. Painters have got wrong impressions about it. For instance, some declare that it has toxic effects, whereas there is nothing in its composition that should prove injurious to workmen, unless it be the very small amount of heavy benzine driers it contains.

Its Merits

What are its merits then? It is not affected, like white lead, by sulphur gas, or is it as brittle as zinc white. It is

whiter than white lead, retains its whiteness longer, and gives finer or clearer
tints with colors than white lead. It
works freely under the brush and it is
opaque, covering with two coats where
lead would require three. It will stand
the addition of a large quantity of thinners without losing its elasticity, while
thinning out lead or other pigments the
volatile thinners in both cases will cause
the thinned paint to become short or
brittle.

In lithopone paint, flat wall paint we call it, the binder and thinners is oil, while to make white lead, zinc white, etc., flat we must use considerable turpentine, and while the result is a good flat, the film of the coating is non-clastic, or brittle.

To get a good white lead wall job flat and with a soft sheen it has to be stippled, but this is not necessary with flat wall paint. Lithopone requires more oil in the grinding than white lead does, yet it dries without an oil luster.

For instanct, white lead contains about four gallons of oil to the hundred weight, while lithopone is said to contain as much as eight and one-half gallons.

Lithopone is lighter in gravity than white lead, and much bulkier. I am now speaking of the best grades. Hence it makes a larger number of gallons of mixed paint. But lithopone must be very finely ground in order to get it at its best. Even so, the painter is not advised to get it dry and try to mix it himself, as he will not succeed in making a good paint that way.

Now we shall hear what its faults ar as given by those who have tested in It does not answer for exterior work because its film, while elastic enougy yet is not as tough as it should be fet that purpose. This causes it, upon exposure to the weather, to go to piece quicker than lead. It absorbs moisture The addition of varnish may help it it this matter, by giving a harder are tougher film.

Lithopone paint cannot be combine with white lead, the compound is ver apt to blacken. Add litharge, whit lead or pigments containing lead, suc as yellow chrome for example, and lithe pone paint will no longer be a pur white.

Some lithopone paints have been foun difficult to break up and mix, but i such cases the trouble probably come from the addition of whiting, or rosi compounds that combine with zinc white Some have a too light thinner, light petroleum, whereas the thinning shoul be done with a heavy benzine with high boiling point—asphaltum spirits.

Good Foundation Needed

In the using of this peculiar wall pain it is of the first importance to have proper foundation for it. The new wal surface should be given a coat of ravlinseed oil, though some manufacturer make a priming with directions for it use. If the wall has been painted a some previous time with white lead paint the character of that surface mus be examined, and if the finish was dead flat, then it will not do to pain over with wall paint until properly prepared.

Examine Old Surfaces

No paint would do well on such a preface until prepared for it. Such survee is porous, naturally so from the let that the paint, even when fresh on lacked in binding qualities, and gave absorptive surface. A glue size may elp it, but many simply apply two tass of the wall paint, the first coat sing much of its liquids, but drying out ith sufficient foundation for the second tat, which will likely make a good toking job. At any rate, it would be rong to condemn the paint if only one tat were applied.

Glue Sizing

Glue size is not advised, as a rule, order flat wall paint, as glue will be fected by any dampness. Nor is gloss ze advised, as it also will not resist ater. For a good size use a freework-ig varnish, one gallon mixed with one part of flat wall paint. This has been outdoor perfectly satisfactory.

Lithopone Flows Freely

Lithopone paint is flowed on more cely than white lead paint, and it would not be brushed out much. This cone would result in saving much work and time. And wider wall brushes may used than with white lead paint. Tould the paint dry too fast, causing ps, add a teaspoonful of raw oil to the cellon of paint. Some add a little elast varnish for the same purpose, or make it work easier. But the best wall paints do not set unduly quick.

For thinning out lithopone paste paints do not use more than 15 per cent, of benzine. Linseed oil is found to help the paint.

Laying it Off

In the application of flat wall paint do not lay it off as you would white lead paint, in even strokes, but more as you would calcimine, criss-cross, and when dry it will present a more solid appearance. A good wall paint will not set too quickly for good work, and one man can easily manage a large surface without making laps or brush marks. With some wall paints it is even feasible to touch up any missed or defective places without showing, and this may be done even after the part has long been finished; that is, within reasonable limits of time.

Water in Paints

We have come across some wall paints that contained water, and such paint is not at all desirable; some so-called lithopone paint contains no trace of that pigment. Of course there are all sorts of kinds of all paints.

Preparing the Wall

If in preparing the walls for this paint any cracks should require filling with plaster, better size the same with shellac; allow it to dry before sizing with varnish size. Do not fill cracks or other places with common putty, for it will show under the lithopone paint; if you do use putty make it from dry white lead, whiting and gold size. If the wall is damp it will not do for this paint; but in case you have coated a damp wall with lithopone paint, then apply a coat of oil paint over it and again apply the wall paint.

You may use the same pigments with this paint as with lead paints, but in the matter of yellow and blue it will be best to use zinc yellow and ultramarine blue. Prussian blue and chrome yellow darken lithopone paint.

Testing Lithopone

You can test a lithopone paint for the retaining of its whiteness by coating a piece of board and exposing it to the light, in comparison with a white paint made from white lead or, better still, from zinc white. If hot pressed linseed oil has been used in the wall paint it will likely cause the paint to darken in a few months; this is one of the drawbacks of lithopone paint. As liquid driers contain lead salts they cannot be used with it.

Needs No Stippling

With the proper care in preparing the foundation for this kind of paint, and an observance of the rules governing its use, flat wall paint gives a very beautiful finish not to be obtained with any other wall finish. And it will pay in time and labor to properly prepare the ground for it, as the paint flats without diluting it to the extreme point, spreads easily under the brush, does not require rubbing out, and needs no stippling.

New Association Planned

Convention Called for September to Consider Formation of National Association of Building Trades Employers

OTICES have recently been sent out announcing a national convention of lidding contractors which is to be held. September 23 and 24 at Chicago. The troose given for this gathering is the cusideration of the launching of a lational Association of Building Trades Inployers.

In the letter announcing the conventon the following statement is made:

This will be the first nation-wide athering of building contractors, and yu are urged to answer this preliminary initation immediately, stating the number of contractors who will act as delectes for your organization.

Following are the proposed objects of the National Association as contained the tentative constitution and by-laws formulated by the special committee apointed at the annual convention of the

National Association of Builders' Exchanges, and which will be presented for consideration at the September meeting:

- (1) To unite into one national body for mutual protection and benefit, associations of building trade employers throughout the United States.
- (2) To encourage and assist in the formation of local associations of Building Trades Employers. These local associations shall be composed of trade organizations of the building crafts.
- (3) To assist the affiliated local associations of Building Trades Employers in the adjustment of labor questions.
- (4) To prevent jurisdictional and sympathetic strikes.
- (5) To work for the general welfare of the building industry and to create and maintain uniformity, harmony and

certainty in the relationship between organizations of employers and organizations of employes.

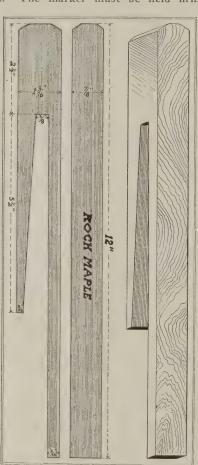
(6) To oppose any unlawful and unwarranted interference with the rights of contractors in the pursuit of their calling.

The time has come when the labor problems in the building industry can be handled successfully only in a national way, and it is therefore imperative that this National Association be launched immediately.

The letter is signed by W. F. Hennessy, Secretary, Building Trades Employers Association, Cleveland; E. M. Craig, Secretary, Building Construction Employers Association, Chicago; and C. C. Pierson, Secretary, Builders Exchange, Indianapolis.

A Few Hints on Clapboarding By D. B. Barry, Redford, N. Y.

I noticed in NATIONAL BUILDER for April that Ira A. Wright criticises a siding hook illustrated in the October issue. I am inclosing a sketch of my clapboarding hook; I have used this hook since 1885-6 and always get good joints on all sorts of cornerboards and casings unless they are beveled under. I have used it on feather-edge with the same good result. I never use a knife to mark with; always a slender, hard pencil. I make a delicate line and leave it on. The marker must be held firmly



against the casing and squarely on the boards to be marked.

Our feather-edge boards here are $4\frac{1}{2}$ to 6 inches wide, 4, 5, and 6 feet long, squared on both ends. On these I do not use a hook much. We get Oregon siding also 6 feet long, $4\frac{1}{2}$ inches wide squared both ends; the thin edge is about 3/16 of an inch thick, these do not give much opportunity for the hook.

If I have a lot of 16 to 16-foot clapboards to lay, I take a steel square and cut both ends and gage them before I begin; a trysquare will not cut them true on account of the shrunken ends. I make a special panel gage to mark them, using a hard flat pencil with the wide point deflected to the rear; always gage with the left hand.

In running up a frame, measure the height of the frame and divide it into the required number of boards, then gage 1/16 inch less than the width allowed to the weather. Strike a fine silk line from corner to corner occasionally to keep the courses level. Many here line the whole wall and begin at the top and clapboard down, shoving each board up to the line, tacking it and thus continuing to the bottom. I never do.

At the left-hand end of the board the nail should be driven in the edge of the

casing at the gage mark; the right-ha nail is driven in the face of the casin the board is set up and fitted and t right-hand end marked with the hoo The remnant with one end square saved for a narrow space or used at one

When two frames are only 1½ to inches apart a piece as high as the frame should be got out to fit, with the farepresenting clapboarded surface.

In using Pacific coast cedar clapboar they should be laid on the ground a da ahead with the cup side down; later tu them. When they absorb enough moi ture they become tough and there is a trouble from splitting.

A Device for Handling Brick

This device saves much of the time and labor usually employed in handling brick. The illustrations show a wagon being unloaded with its aid, and a close view of the method of handling. Time and labor are not only saved by this device. There are no gloves that will stand up under the wear of handling brick, and there are no hands, no matter how hard and horny that will not become sore handling brick in the process of loading and unloading. There is something to be wished for to improve the method of dumping the brick in a pile as shown, however.

The device is made of metal and comprises a straight bar about 18 inches long with flat blades about 3x3 inches, turned down at right angles to the bar. One of these blades is fixed to the bar while the other is attached to a lever handle which is pivoted to the bar at the other end. In picking up the device the lever handle is pulled up and the bricks drawn tight between the blades. The bricks are released by releasing the pull on the lever handle when the bricks are thrown.





Publications Received

Announcement is made that the Flintte Company of Boston, Mass., has acired the felt mill property of the Bern Paper Company at Little Ferry, N. J. his mill will be operated by the Flintte Company, and its output will be gely absorbed by that company's roofmill at Rutherford, N. J.

Modern Oak Floors Good for a Hund Years—This handsome brochure mes from the Oak Flooring Manufacters Association, 1014 Ashland Block, icago. In its pages the application of a floors are comprehensively exploited all the varied applications and cously illustrated, very fine reproducts of the characteristic grains of oak ng shown in colors.

Latalogues of Diamond Metal Weather ipping and Calking Compound—Is6 by the Diamond Metal Weather ipping Co., Columbus, Ohio. These sent an extensive array of structures are these specialties have been apple and also illustrative and descriptext showing the approved methods application for rendering openings ther tight and conserving coal.

ndustrial Transportation—The Bicy—This brochure, issued by the Bile Manufacturers Association, 36 Pearlet, Hartford, Conn., gives reproducts of letters from manufacturers testing to the large number of employees bicycles, with illustrations of the thods of storing the employees' manufactures in the various factories.

irculars of the Lunkin Unit-Window assued by the Lunken Window Co., Cherry street, Cincinnati, Ohio, preting illustrations and descriptive text he Lunken Unit-Window fitting into plans of any brick or frame building

reducing air leakage in winter and affording 100 per cent ventilation in summer.

Latches for Garages and Barn Doors— These are presented in a calendar folder by the National Manufacturing Co., Sterling, Ill., completely illustrated and with descriptive text.

New Catalogue of Bommer Spring Hinges—Bommer Bros., 263 Classon St.,

The publications listed herein can be obtained on request. Keep a live file of catalogues and trade literature, Mr. Builder. It will pay you to keep posted

Brooklyn, N. Y. This catalogue is No. 43 of the series and is one of the most comprehensive issued, giving figures and dimension tables of the goods and much valuable information.

Damproofing Walls Above and Below Grade—The Hydrex Felt and Engineering Co., 120 Liberty street, New York—Illustrative and diagrammatic drawings, tables and formula for damproofing walls and acidproofing and waterproofing floors are given in this practical circular.

Treatment for Casement Windows—Monarch Metal Weather Strip Company, 4121 Forest Park Blvd., St. Louis, Mo.—Circulars descriptive of the Monarch casement stay and Monarch sash operator.

Shope Concrete Brick-Shope Brick

Company, 361 East Morrison street, Portland, Oregon—Illustrative and descriptive catalogue of Shope Concrete Brick and Shope machines for manufacturing brick in various faces and colors.

F. E. Myers & Bro. Hay Tool and Door Hanger Catalogue No. HT54—F. E. Myers & Bro., Ashland, Ohio—This is the most complete catalogue issued by Myers & Bro., showing an entire line of hay unloading tools, door hangers, hay rack irons, store ladders, etc.

Stewart Monogram—House organ of the Stewart Manufacturing Co., 165 Rath street, Waterloo, Iowa—Exploiting concrete mixers, elevators, pump jacks, unitruck attachments, dump cars, material screens, contractor's pumps, car trucks, line shafts, cement block machines, and sanitary indoor toilets.

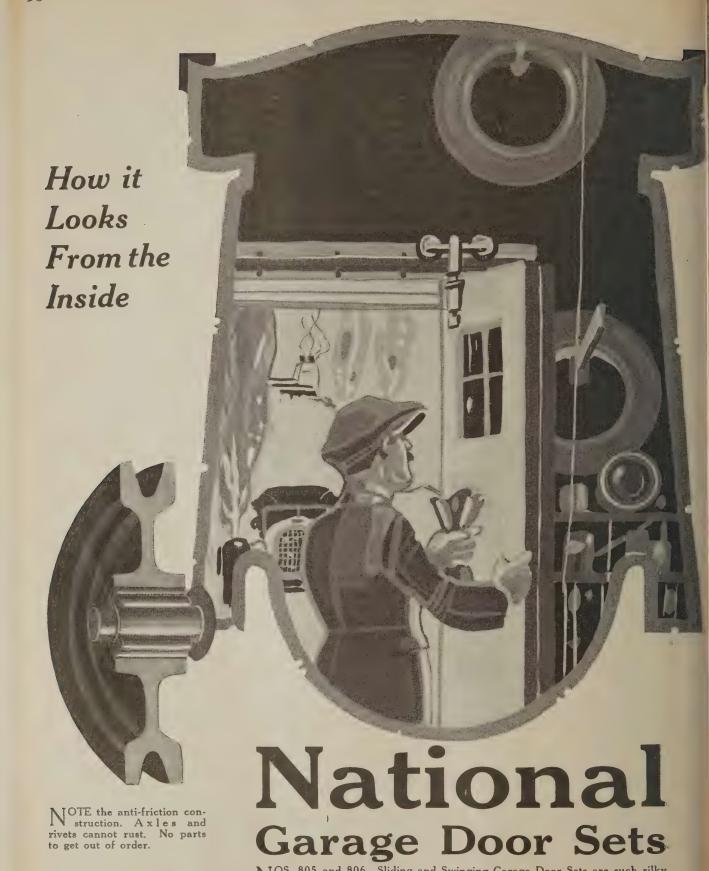
The Only Screw Holes in the World—The Stine Screw Holes Co., Waterbury, Conn.—Exploiting a new device whereby a screw hole socket can be driven by a hammer, making a permanent screw hole that will not pull out.

How to Chart—Lesson 1 of the Business Charting Institute, 10th floor, 104 South Michigan Avenue, Chicago.

The Youngstown Sheet and Tube Bulletin—House organ of the Youngstown Sheet & Tube Co., No. 1, Vol. 1—A neat and well illustrated paper devoted to the interests and recreations of the employes of the company.

Bricklath—A substitute for wood lath, expanded metal, wire, and other types of metal lath.—Composite Metal Lath Co., 6 North Michigan Avenue, Suite 407, Chicago, Ill.—Presenting the claims of brick baked on woven wire as a better base for plaster and stucco.

The daylight saving law has been repealed over the President's veto owing to it proving undesirable to farmers. That it is desirable for Manufacturers and their employees and an effective conomy is conceded. John M. Glenn, Secretary of the Illinois Manufacturers Association, suggests that all concerned will be atisfied if business is shoved ahead an hour in the cities where he daylight saving system is favored, and "leave the clock done." "There is no reason" says Mr. Glenn, "for any clash between the city and the country on this matter." How would this affect you, Mr. Builder?



OTE the anti-friction construction. Axles and rivets cannot rust. No parts to get out of order.

NOS. 805 and 806—Sliding and Swinging Garage Door Sets are such silky workers that once you try them you will use no others.

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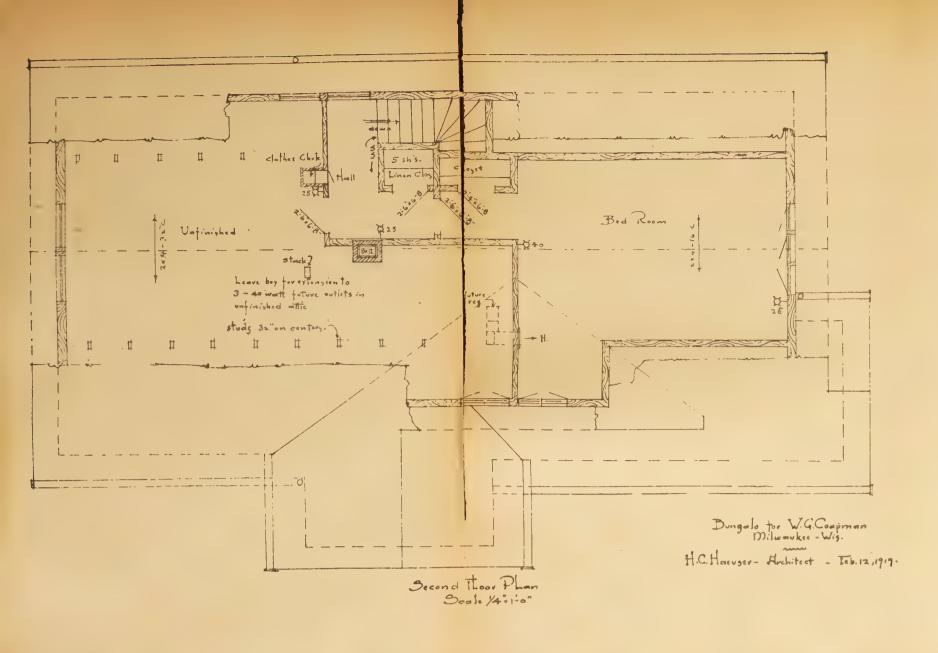
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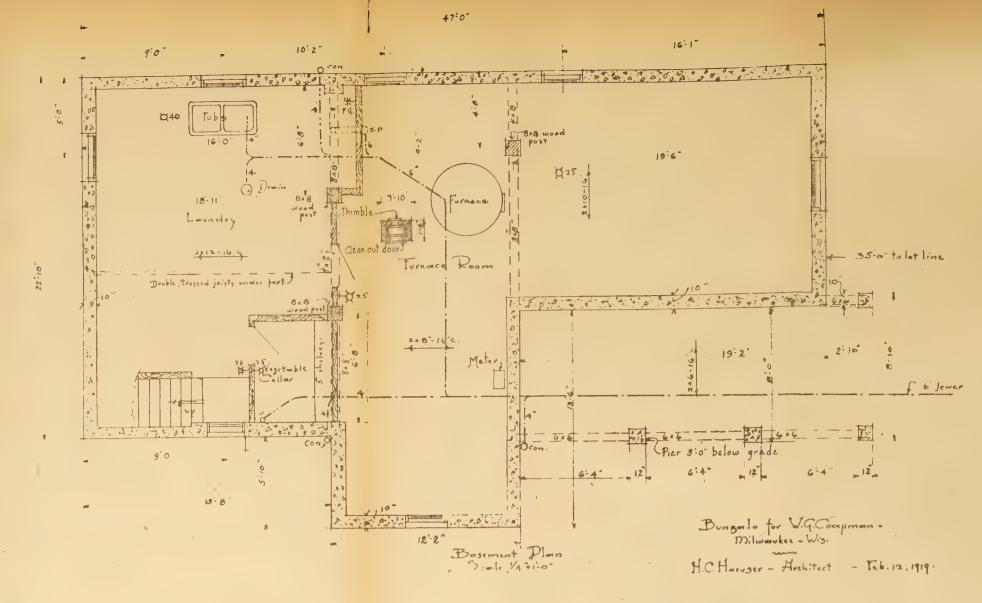
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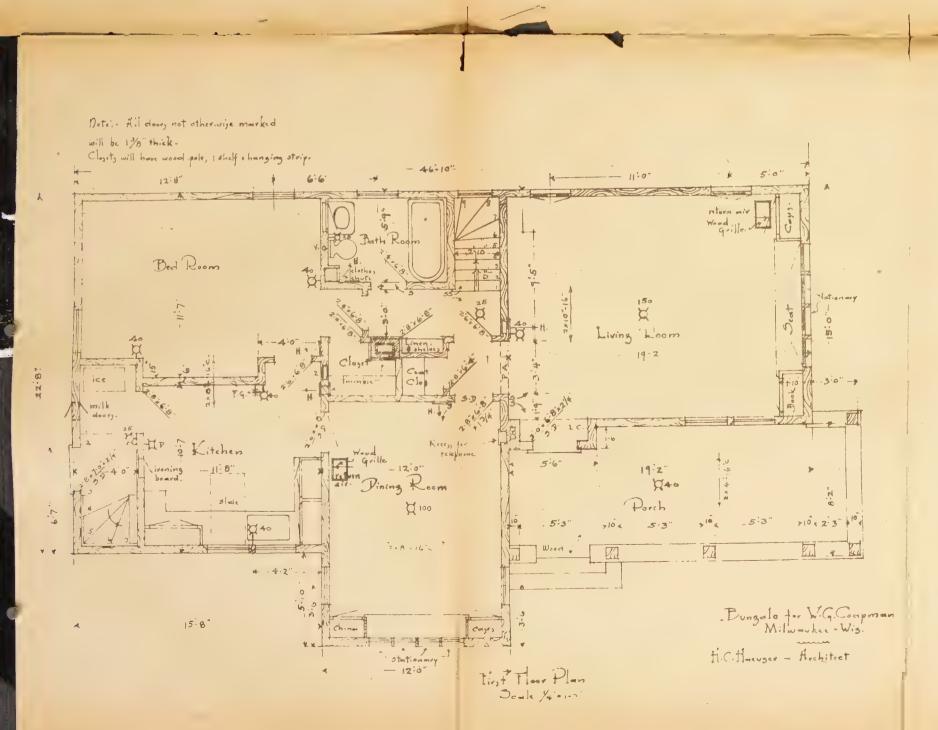
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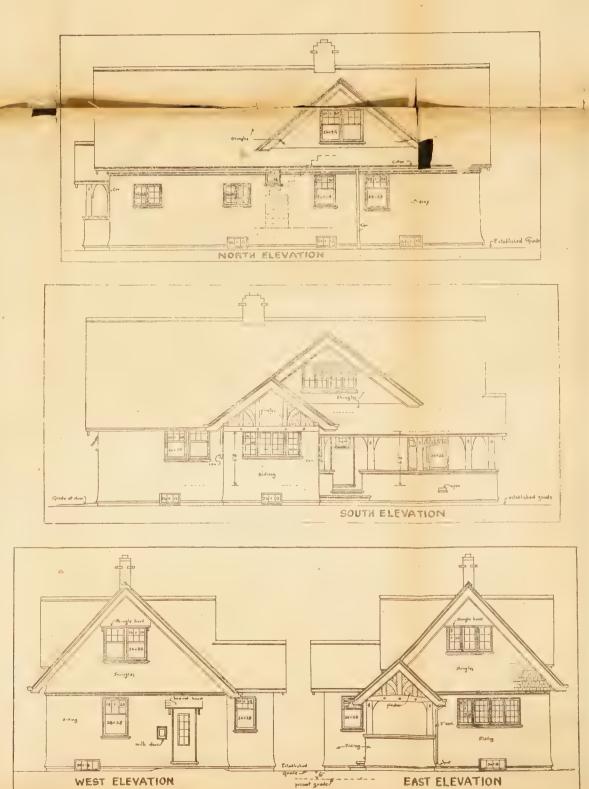


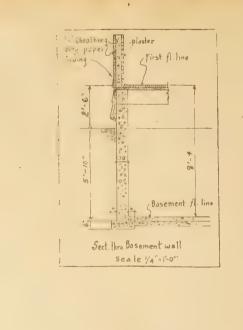




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SEPTEMBER, 1919

SUPPLEMENT No. 469

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No. 10

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NATIONAL BUILDER

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High Wages and High Prices

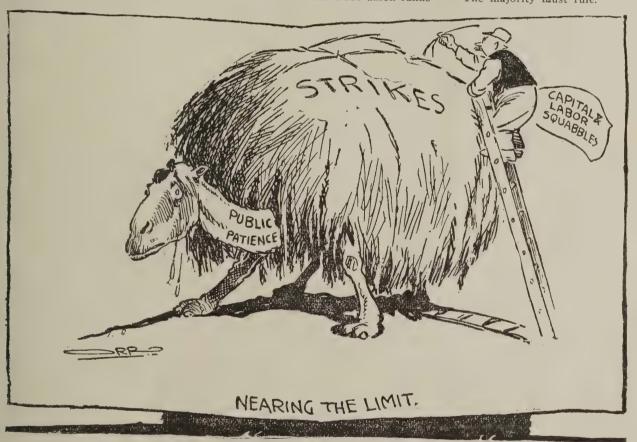
IT is a neck-and-neck race between high wages and high prices. The efforts of the Government to reduce profiteering and high prices has not achieved great results. "Get while the getting is good" is the thought that seems to be uppermost, but "Experience is a dear school, yet men will learn in no other," is an old and true saying that is pointed directly at present conditions. Political interests complicate existing complications and the air is full of rumors so

cause why there should not be peace.

Trade unionists of the standard that have developed the movement in an evolutionary way, are finding their organizations falling into disorder, and are not slow to condemn among themselves practices that hinder production and that must therefore return with a penalty upon the innocent and guilty alike. What provocative practices on the part of employers has strengthened the hands of radical thinkers in the trade union ranks

However, all this may be, there is one fact that stands out above all the turmoil: the people must have homes, and they are going to have them. Building must go on. The cartoon shown herewith, illustrating the saying "The last straw broke the camel's back," does not imply that this camel's back will be broken, but rather that he will hump himself to a purpose that will ditch the load that oppresses him.

"The majority must rule."



From the Chicago Tribune

liverse that truth and fiction are badly nixed.

President Wilson has set the date of October 6 to take into consideration with abor and other interests the course that hall be followed to adjust the social and ommercial order. Meantime the steel nd iron industry is in the throes of a trike of so menacing a nature that the Inited States Senate has summoned the eads of the contending parties to show

has not been set forth, but will be brought out in part undoubtedly by the Senate Investigating Committee.

If the warring, disunited factions could see themselves with the eyes of the gods they might see that a comparatively brief period of united purpose and united action in production and thrift would lift the United States into the broad road of unprecedented prosperity.

Meantime, a boom in building is beginning that is predicted will last for at least ten years.

From every section of the United States come demands for homes, schools, churches, and factories, and all manner of building—but the greatest demand is for homes.

Let the builder make his contracts in accordance with present conditions and keep moving. He is needed everywhere.

National Association of Building Trades Employers

One Hundred and Sixty Delegates from Thirty-Four Cities in Convention in Chicago, September 23 and 24, Form a National Organization of Building Trades Employers

THE call announced in NATIONAL BUILDER last month for a convention of building trades employers was responded to by 160 delegates from 34 cities, and a two-days' session was held, September 23 to 24, in the work of organization.

The organization committee—Chas. J. Kelly, New York City; E. M. Craig, Chicago; D. T. Riffle, Pittsburgh; J. D. Stoddard, Detroit; C. C. Pierson, Indianapolis; Chas. F. Waltz, Cincinnati, and W. F. Hennessy, Cleveland—submitted the following constitution and by-laws, which were adopted after debate, the only modification being in the matter of fees and dues:

CONSTITUTION

ARTICLE I

Name

This organization shall be known as the National Association of Building Trades Employers and shall co-operate for their mutual advancement with the National Association of Builders Exchanges.

ARTICLE II Objects

The objects of the National Association of Building Trades Employers shall be:

- (1) To unite into one national body for mutual protection and benefit, associations of building trades employers throughout the United States.
- (2) To encourage and assist in the formation of local Associations of Building Trades Employers. These local Associations shall be composed of trade organizations of the building crafts.
- (3) To assist the affiliated local Associations of Building Trade Employers in the adjustment of labor questions.
- (4) To prevent jurisdictional and sympathetic strikes.
- (5) To work for the general welfare of the building industry and to create and maintain uniformity, harmony and certainty in the relationship between organizations of employers and organizations of employees.
- (6) To oppose any unlawful and unwarranted interference with the rights of contractors in the pursuit of their calling.

ARTICLE III Membership

Section 1. Membership in the National Association of Building Trades Employers shall be by local associations. Such associations to be composed of the membership of organizations of contractors, grouped together by trades into a local body.

Section 2. Any local association eligible for membership shall make application for charter to the Executive Council of the National Association of Building Trades Employers.

ARTICLE IV Officers

Section 1. The Executive Officers of the National Association of Building Trades Employers shall consist of a President, First Vice-President, Second Vice-President, Third Vice-President, Secretary and the Treasurer, all of whom, with the exception of the Secretary, shall be elected by ballot at the annual convention of this Association and to hold office for one year or until their successors are elected or appointed. A majority of all ballots cast shall be necessary for election.

Section 2. The Executive Council shall select the Secretary, fix his salary and he shall be under its direction.

ARTICLE V Executive Board

Section 1. The membership of the Executive Board shall consist of one member from each local association, such member to be selected by the local association.

Section 2. The Executive Board of the National Association shall have entire jurisdiction over the affairs and funds of the Association except such as are expressly given to the officers and Executive Council.

Section 3. Fifty per cent (50%) of the membership, represented by sixty per cent of the locals shall constitute a quorum for the transaction of all business.

ARTICLE VI Executive Council

Section 1. The Executive Officers of the Association shall constitute the Executive Council of the National Association of Building Trades Employers.

Section 2. The Executive Council

shall be responsible to the Executive Board and in the interim between Board meetings shall exercise all the powers of the Board except the power to experimembers and to order a general cessation or resumption of work.

ARTICLE VII Delegates to Convention

Section 1. The basis of representation on a roll call vote at any meeting of the National Association of Building Trades Employers shall be:

Three votes from each local Association of Building Trades Employers, having from one to one hundred members.

One additional vote for each additional 33 members from each local Association of Building Trades Employers.

Section 2. No local association shall be entitled to representation unless such association is in good standing in the National Association of Building Trades Employers at the time of meeting.

ARTICLE VIII Fines and Penalties

Section 1. The Executive Council shall have the power to fine, suspend, or both, local associations for any violation of the Constitution and By-Laws or any lawful order, rule or regulation. But it shall not exercise such power until written complaint has been received and ample opportunity for defense given to the local association against whom complaint is made.

Section 2. A suspended local association shall be deprived of all privileges and benefits of this Association during the continuance of the suspension. A local association ceasing to belong to this Association for any reason shall be deprived of all privileges and benefits and shall lose all interest in any assets of this Association.

ARTICLE IX

Section 1. In order to insure compliance with the lawful agreements, orders and regulations made in pursuance of the Constitution and By-Laws, and amendments thereto, each local Association of Building Trades Employers shall sign an agreement in form to be prescribed by the Executive Board and to abide and be governed thereby, and obey and comply with the lawful agreements.

decisions, orders, rules, resolutions and regulations of this Association.

ARTICLE X Resignations

Section 1. Any local association may resign from this Association by delivering to the Secretary of the Association a notice in witing of such intention to resign, and at the expiration of six months from the delivery of such notice, by delivering to the Secretary a written resignation, provided that such local association is not in arrears either at the date of notice or resignation, in respect to any payments whatsoever due this Association, and provided, further, that there is not at the time of giving such notice nor within one month thereafter, any labor trouble, either pending or threatened.

ARTICLE XI

Section 1. Members of any local Association of Building Trades Employers who carry on building operations in localities which are under the jurisdiction of any other local Association of Building Trades Employers, a member of this Association, shall affiliate with the local association in the state or territory where work is being performed.

ARTICLE XII Assets of Association

Section 1. Should this Association for any cause whatsoever cease to exist, then each local association in good standing shall receive its share of the assets of the Association in proportion to the amount such member has paid into the Association.

ARTICLE XIII Amendments

Section 1. Proposed amendments to this Constitution shall be referred to all affiliated local associations at least 30 days prior to a regular meeting. Such proposed amendments shall be referred to the meeting to be voted on by the delegates for adoption.

Section 2. If two-thirds of all votes cast by delegates in meeting are in favor of a proposed amendment it shall be adopted.

BY-LAWS

ARTICLE I Meetings

Section 1. The annual meeting of the National Association of Building Trades Employers shall be held at such time and place as the Executive Council shall determine.

Section 2. Special meetings shall be called by the President on request of a majority of the affiliated local associations.

Section 3. The regular for special meetings of the Executive Council or the Executive Board may be called by the President or upon the written request of three or more local associa-

tions, provided that not less than 72 hours' notice shall be given.

ARTICLE II Duties of Officers

Section 1. The President shall preside at all meetings. He shall be exofficio member of all committees and shall countersign all checks and drafts for money.

Section 2. The Vice-Presidents, in their order, shall assist the President in the discharge of his duties, and in his absence shall perform the duties of the President.

Section 3. The Secretary shall attend all meetings of the Association and keep the minutes of the proceedings and conduct the correspondence of the Association and execute all business that he may be officially instructed or authorized to perform. He shall, with the sanction of the Executive Council, be permitted to employ whatever help may be required for the proper performance of his duties. He shall collect all fees, dues, fines, and such other moneys as may be due the Association, and shall keep in boloks suitable for the purpose, a correct account of same. All moneys received by him shall be immediately transmitted to the Treasurer. The Secretary shall furnish a bond to the National Association of Building Trades Employers in form and amount satisfactory to the Executive Council.

Section 6. The Treasurer shall account for and deposit all moneys received by him in the name of the Association in such bank or trust company as may be designated by the Executive Council, and shall not be drawn except by a check signed by him as Treasurer and countersigned by the President. He shall pay all bills and other indebtedness when ordered so to do by the Executive Council and shall make a detailed report at the annual convention of the Association. His accounts and books shall be audited at the discretion of the Executive Council. He shall furnish a bond to the Association in form and amount satisfactory to the Executive Council.

ARTICLE III Nomination of Officers

Section 1. A nominating committee shall be appointed by the President at the annual meeting of the Association, which committee shall submit to the delegates a list of nominees for officers of the Association.

Section 2. Additional nominations may be made from the floor.

ARTICLE IV Vacancies in Office

Section 1. Should there be a vacancy in any office of the Association, except that of the President, the President shall appoint a successor to fill the vacancy for the unexpired term, subject to the approval of the Executive Council.

ARTICLE V Fees and Dues

Section 1. The initiation fee for membership for any local association in the National Association of Building Trades Employers shall be \$100.00, payable at the time application for charter is made.

Section 2. The annual dues for each local Association of Building Trades Employers shall be 20 cents per \$1,000, or one-fifth of one per cent of the business of its membership.

ARTICLE VI Amendments to By-Laws

Section 1. Amendments to these By-Laws may be made in the same manner as provided in the Constitution. The By-Laws, however, may be suspended at any meeting of the Association by unanimous vote.

ARTICLE VII Order of Business

Section 1. The order of business of meetings shall be:

- (1) Roll call.
- (2) Reading of minutes.
- (3) Appointment of convention committees.
- (4) Report of officers.
- (5) Reports of standing committees.
- (6) Unfinished business.
- (7) New business.
- (8) Reports of convention committees.
- (9) Report of nominating committee and election of officers.

ARTICLE VIII Rules of Order

Section 1. Roberts' Rules of Order shall govern the meetings of this Association and the Executive Council, the Executive Board, and of all Committees thereof.

The officers elected are James R. Strong, New York City, president; Andrew Landquist, Cincinnati, first vice-president; V. R. Gould, Omaha, Neb., second vice-president; George W. Donly, Cleveland, third vice-president; Max Baumann, New York City, treasurer.

Executive Committee—P. M. Fogel, Kansas City, Mo.; D. T. Riffle, Pittsburgh, Pa.; E. J. Thomas, Memphis, Tenn.; C. J. Kelly, New York City; C. F. Waltz, Cincinnati; G. C. Miller, Webster City, Iowa; E. M. Craig, Chicago; C. C. Pierson, Indianapolis, Ind.; W. F. Hennessy, Cleveland; Chas. W. Bernhardt, Atlanta, Ga.

Under these auspices the new organization will possibly convene subject to call early next year.

A Small Wooden Church

Supplement No. 470

Tilghman H. Moyer, Architect and Builder



Church at Rittersville, Pa.

THE building fund of the average congregation is almost always too small to accomplish all that is expected of it. About twice as much church building is usually desired for the same amount of money that would be considered necessary to put up another class of building. A builder's cupidity is sometimes appealed to by the possibility of his gaining the good-will of the congregation if he makes a very low price and lands the job, thus gaining a certain amount of valuable publicity. It should be re-

membered, however, that it is often a puzzling proposition to satisfy even a majority of a congregation, not to speak of all of them, and that there will almost invariably be dissatisfied ones who may in some cases cause the job to lose more future business than it will gain.

There is no satisfactory reason why a builder should be expected to put in three or four months of his time without profit, even on a church job, yet many church members apparently feel that he should. It is perhaps well enough to

figure the profits on such work at a somewhat lower rate than is common for other buildings, but to skin the price down to bed-rock cost is dangerous and unfair to the builder and his business. A builder who figures any sort of a job without including a fair profit is inviting disaster. Before proceeding on a building it is also important that the builder assure himself that ample funds have been provided for carrying the work through. Thoroughly honest building committees sometimes proceed on

the theory that, although there is not enough money to take care of the work, the Lord will provide the remainder. This is not a day of miracles, however, and many builders can lay their business failure to a lack of care in obtaining information about the financial condition of their clients. As things are, the average builder takes enough chances without flying in the face of Providence.

Every church or other similar building should be built under the supervision of a duly appointed building committee, and the builder should make sure that the members of these committees are legally authorized to act for the congregation. Builders have gone into court to collect money due them on a contract, only to find that their claims were worthless because the committee with which they dealt had no legal right to represent the congregation in making contracts. These pitfalls may seem to be given undue prominence, but they are nevertheless important.

When the degree of valuable publicity is considered the matter of "looks" should not be slighted. A church building is a sort of center upon which many critical eyes are focussed, and the wise designer will devote much effort toward obtaining a pleasing result.

It is a matter of common observation that small wooden church buildings are seldom attractive in appearance. This statement, of course, applies to the building alone and does not refer to the picturesque effects which are often obtained by means of vines and so forth. Nature is a powerful aid to design, and with her aid many otherwise hopeless designs may be rendered attractive.

In general, small wooden church buildings seem to run to two extremes. They are either so plain and lacking in charm that they resemble a packing-box more than they do a place of worship; or they are so overloaded with meaningless details and claptraps that they lose all of their religious spirit. A large amount of money is frequently as detrinental to good design as too little would be.

The designer who solves his problem the simplest and most direct manner susually assured of an attractive result, hat is, provided he does not carry the implicity to an extreme. A certain mount of ornament and of detail is, f course, necessary to give interest to design, but such aids should be used paringly and in such a manner that heir use seems logical.

Laying out a plan for a small church a comparatively simple problem. It equires only the application of common ense to certain general requirements thich are in themselves simple. The sating capacity is usually the first thing be considered. In estimating the sating capacity of churches and other

similar auditoriums it is usually considered that six and one-half square feet of floor space represent the area required for one "sitting"; this includes the space for aisles and so forth. For instance, if it is desired to estimate the floor space required to accommodate 200 persons it is only necessary to multiply 200 by 6½; the product is 1300, and represents the number of square feet of floor required.

Complete
Working Drawings of this
Church
are
given in
the Supplement No. 470
to
this Issue
of National
Builder

Dividing this number by the width or by the length of the auditorium will give the other dimension. In this case if a width of thirty feet is desired, dividing 1300 by 30 gives slightly over forty-three feet for the length of the auditorium. Of course, these results are only approximate and to find the actual number of sittings, the seats and aisles must be laid out to scale. Seats are usually placed about twenty-eight inches apart, measured from back to back. Center aisles are about four feet wide, and side aisles three feet. Eighteen inches of seat length is supposed to represent one sitting.

Windows should be high to afford good light and ventilation. Exit doors should be placed at the sides or rear, as well as at the entrance, so that the auditorium may be rapidly cleared in case of fire or panic. All exit doors should open outward.

Heating buildings of this type is usually economically provided by means of a single pipe furnace, with the register placed near the center of the auditorium. The pastor's study, choir room and other minor rooms are sometimes provided with auxiliary heat so that at times when only these rooms are in use, it is not necessary to heat the entire building. Stoves or fireplaces are sometimes provided for this purpose. The church building, which forms the supplement for this issue of NATIONAL BUILDER, is a most attractive example of a small wooden church. It was designed and built by Tilghman H. Mover for the Lutheran congregation at Rittersville. Pa. The design is well suited to the material of which it is built, and offers practicable and interesting solution for the problem.

The hood, the shutters and the Palladian window above the entrance add a picturesque quality to the building, which is very pleasing. The tower is simple and well proportioned. The wooden buttresses which show on the side of the building in the photograph, but were not included in the original drawings, are not suitable for wooden construction. Buttresses in masonry construction usually serve a definite purpose, viz.: resisting the thrusts of widely-spaced trusses, but in frame construction they have no reason for being and should not be used. The gable above the side door is a trifle too large-dropping its ridge two feet would be an improvement.

The plan shows an auditorium with a seating capacity of 240 people, and the choir seats 36 additional ones. There is also a small choir room and a pastor's study at the entrance end of the building. The entrance vestibule is quite large; in fact, it might be admirable to place coat closets along its side walls as they would be found highly useful for umbrellas, wraps, and so forth, during bad weather. There is a small concrete basement under the pastor's study to accommodate the heating plant. The other foundations are of post and girder construction, with the posts resting on concrete piers sunk below frost.

The main roof is supported by rafters which form modified scissors' trusses. This roof is covered with prepared roofing, but the smaller roofs are covered with shingles. The interior walls are finished with sand finish plaster tinted buff color. The interior trim is of yellow pine, stained. The floors are of single thickness, yellow pine. The siding is of 1 by 10 surfaced boards nailed directly to the studding, with building paper between. The exterior walls are stained brown and the outside trim is painted white.

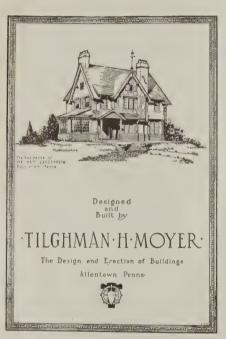
The drawings shown on the Supplement illustrate fully the important points of construction and the details. They are well worthy of the study of any builder who desires to keep abreast of modern methods in construction and in design.

The Science of Building

Taking Hold of Building as a Business and Not a Mere Trade, This Builder Has Made a Success, and His Methods Are Described in This Article

A FEW years ago it was considered that the only qualifications necessary for a builder to have consisted of a more or less thorough knowledge of construction and an ability to finance his operations.

Generally speaking, the typical builder of those days devoted practically all of his time to the actual work in the field. His bookkeeping outfit usually consisted of a pocket time-book (which was frequently a source of argument on pay day) and in some cases a memorandum book in which other accounts were kept.



This cut is used on the back cover of the telephone directory. The subject is changed from time to time and forms an attractive means of advertising

His estimating methods were equally careless, and his estimated costs were usually based on some rule of thumb system which closely approached mere guessing. His houses were often built without the aid of drawings, or with such carelessly made ones that dimensions failed to check and the elevations would not be brought to fit the plans. He had no accurate means of determining how much money his men or his machines were making on a job, and his business as a whole was conducted in such a haphazard manner that he was forever applying the profits on one job to the losses of another.

This sort of thing could not last. Ener-



Tilghman H.Moyer

the Design and Erection of Buildings
Allentown, Penna.

The stationery is made of heavy bond paper and the lettering is embossed. The symbol is also embossed and is printed in two colors, orange and black. Even stationery has influence in landing a job

getic builders saw the uncertainty and waste that were involved and set themselves to the task of correcting the evils. Of course, such evils cannot be done away with in a day. It requires time to accumulate data, to work out systems, and to build up an effective organization. It also requires a very considerable amount of courage for a man to step in and attempt to revolutionize old established trade customs. Fortunately, however, there are such men. Men of high caliber, full of pep and initiative, who will devote every effort toward the improvement of conditions in their line of business. This type of man is usually highly unselfish and is willing-in fact, is desirous—that others may benefit from his labors. It is to men such as these that we are indebted for the remarkable progress that has lately been made in the profession of building.

As a practical example of a highly efficient building organization, the one headed by Tilghman H. Moyer of Allentown, Pennsylvania, has been selected. Most of the principles upon which this organization is founded are novel and in many cases are entirely original. That they are practicable and profitable is borne out by the material success of the organization and the high repute in which it is held by the people of Allentown and vicinity.

Mr. Moyer, however, does not care to assume sole credit for working out the methods described in this article. The organization as a whole is responsible for them, and in this fact lies much of their value. They do not represent one man's ideas, but the combined efforts of several. Every man in the organization feels free to offer suggestions and to criticise methods. There is no friction and no jealousies; the relation between employer and employee is well knit, and the interests of one are held to be the interests of all.

Mr. Moyer began operations in Allentown some six years ago. His business is "the design and erection of buildings," and this phrase is always used on his stationery and in his advertisements. It is only another way of saying "architect and builder," but is more effective because it is "different." Novel phrases such as this stick in the public's memory and have high advertising value.

In perfecting his organization Mr. Moyer has selected high-grade practical men to head the different branches or departments into which the business is divided. These men are personally responsible for the work of which they have charge. This relieves Mr. Moyer of a great deal of routine work and yet enables him to give close personal supervision to the work as a whole.

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No. 1—This form gives a detailed history of changes and extras. It offers insurance against disputes

TILGHMAN H. MOYER

BUILDING BESIGN AND ERECTION

824 HAMILTON STREET

ALLENTOWN, PA.

		DESIGN AND ERECTLENTOWN, PA.	TION No.	
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THUR.	-			

No. 2—This is the workman's timecard. It covers a week's work, and is filled in daily by him. This removes another source of disputes

The business is at present organized into four departments. The architectural department, in charge of E. R. McMahon, prepares all of the drawings, details and specifications. That these men are real designers can be seen by a glance at the

photographs.

H. A. Schweyer, a construction man of twenty years' experience, is the head of the construction department and has direct charge of the work of erection. The job foreman, mechanics, trucks and subcontractors come under his care.

The department in which the details of finances and records are attended to is in

charge of J. D. Hersh.

To the fourth department is assigned the making of purchases, sub-contracts and the following up of deliveries of material.

Generally speaking, the firm carries a building through from the beginning to the end. Sketches for the client's approval are first prepared, then the working drawings are made; and finally the materials are bought and the building is erected, the entire operation being put through by the one organization. course, Mr. Moyer does considerable work under architects, but the essential purpose of his organization is to concentrate all of the phases of building so that one firm is responsible for every portion of the work. This is in line with the recent activities of some of the members of certain purely architectural societies who are endeavoring to broaden the individual responsibility of members of their profession by returning to some system similar to that under which the Gothic cathedrals of Europe were designed and built by "master-builders," corresponding n a way with the status of our modern irchitects.

In interviewing a prospective client, Mr. Moyer attempts to convince him that t is not a difficult task to construct a satisfactory building. And it isn't, providing that the builder has a clear understanding of the client's needs and desires. These needs and desires can in most ases be unearthed only by a builder who

is thorough and observant in his first dealings with a client. That is, he must gain the client's confidence and size up his requirements. For instance, if the building is to be a residence, it is not enough to learn merely that so many rooms are desired, that the walls are to be of brick and that it is to cost so much, but such things as the class of entertaining that is done by the family and whether the washing is done at home or whether it is sent out, must be threshed

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No. 3—The foremens' daily report. It supplements the workmen's time card and offers a check on the progress of work and materials on hand

out. These points are apparently small in themselves, but it is exactly these minor things that determine the success of a building.

Either during a conversation with a client or shortly thereafter, Mr. Moyer writes down whatever suggestions and requirements that he has gathered during the talk. These notes are turned over to the designer and rough sketches are prepared. These sketches are then submitted to the client and every phase of the problem is taken up in detail. At this stage it is desirable that all of the more important members of the family be called into the conference so that such things as the desired height of the kitchen sink; the proper location of electric receptables, and all such points may be finally determined.

After the general scheme of the building has been approved by the owner, and before the working drawings are commenced, the sketch plans and outline of the specifications are edited by the men in charge of construction and of purchases, so that the building will be, not only architecturally correct, but that the desired effects will be secured with the least cost.

Next come the working drawings These are models of accuracy and clearness. Every bit of detail that might be subject to question on the job is worked out, and every effort is made to reduce the chance for error to the minimum. The specifications are also carefully written to cover all points that cannot be taken care of by the blue prints. The preparation of the working drawings and the specifications is a critical point in any operation, and Mr. Moyer feels that the time spent here will be amply repaid to him and to the client by later savings of both time and money on the job in the field.

The policy of the organization is that the client is always in the right. The

ORDER FOR CHANGES

OFFICE COPY



Job No.____ Order No

To TILGHMAN H. MOYER.

Dated at

Allentown, Pa.:

In accordance with the terms of our Contract dated

covering the erection of....

at.

, I hereby authorize and direct

additions to

you to furnish all labor, tools and material necessary to make the following alterations in the work shown by the original plans and specifications, (together with such incidentals as are required to complete the work herein briefly described:)

In consideration of which I agree to pay you the sum of

..... Dollars (\$

in addition to the sum mentioned in the Original Contract above referred to, at the time of

and with the _____payment, due.

Material

Signed Copy...

Charged

Gen'l Foreman.

Drawings

average client has not had the training necessary for a full understanding of No. 4—The form at the top is self-explanatory. The one at the left is the truck driver's form. It is in the shape of an envelope, 6x9 inches in size

working drawings and specifications and in many cases he feels that he is entirely at the mercy of the builder. Mr. Moyer does not argue fine points with him. If the client seems to feel that a phase of the work is not being carried out in just the manner that he had in mind, Mr. Moyer immediately and without any quibbling, makes such changes as are necessary to give satisfaction. This policy extends even beyond the completion of the work. If months after the client accepts a building, some fault develops that might by any possible chance be laid to poor construction, it is taken care of without argument or charge. This policy has been largely instrumental in building up the reputation and the success of the organization. Mr. Moyer's former clients swear by him, not at him.

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No. 5—This is the office form for trucks. It supplements the truck driver's record and offers a cost comparison for estimating purposes

and are always available as a means of of 2.2 miles; these figures are giving confidence to a new client.

Considerable care is used in the selecity is loaded and leaves at 9 o'cle

tion of workmen. The men must be in sympathy with the spirit of the organization and must be led to have something more than a dollars and cents interest in doing their work. A few careless or indifferent workmen on a job will speedily destroy all of the confidence that a builder can instil into a client. Foremen are selected who can give confidence to prospective clients who may visit one of the jobs. These foremen are given to understand that they are Mr. Moyer's personal representatives in the field and that they shall conduct themselves accordingly. They are expected to explain methods and answer the questions of any interested persons who may visit the work.

The organization does not confine itself to any particular class of work, as is evidenced by the fact that they now have under construction such varied projects as a large fraternity house—which they have also designed, a long concrete coal trestle and several silk mills, one of which, costing over forty-five thousand dollars, is being speeded to completion on a schedule of four weeks from the date of commencement.

Several of the office forms used by the organization are reproduced in connection with this article. Number 1 is the form designed for use in determining the cost of motor truck hauling. This form is to be filled in by the truck driver. The columns headed A., M., L., designate respectively the time of arrival, the speedometer reading, and the time of departure. For instance, the truck leaves the garage at 8:30 in the morning with the speedometer at 0.0. It arrives on the job at 8:45 with a speedometer reading

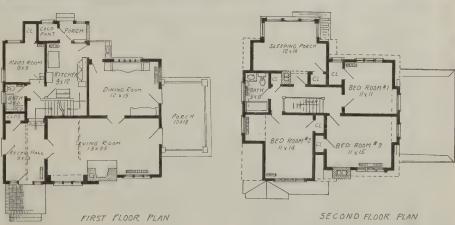
of 2.2 miles; these figures are noted on the form by the truck driver. The truck is loaded and leaves at 9 o'clock; this is also noted. The truck is driven to its destination and the proper notations made in the similar columns under "Un-



Window treatment

loading," and so on throughout the day. The filling in of the other columns and spaces does not require description. This form is 6x9 inches in size and is made in the shape of an envelope. It is mailed to the office at the end of the day with





No. 6—The appearance of the house is marred by the hooded awnings, but no other type of awning is practicable for casement windows which open out



No. 7—A Dutch Colonial type with a well arranged plan. The den would be convenient for use as a sick-bay

any bills, receipts, etc., enclosed within it. Form No. 2 is designed for office use in connection with No. 1. It is a weekly summary compiled from the data furnished by the truck driver's records. This system gives highly accurate data for estimating purposes, actual and estimated costs seldom varying more than one per cent. The truck driver's interest is stimulated by the fact that if at the end of a year these records show a saving in cost over the previous year he is paid an amount corresponding to the saving. In other words he is given a certain business interest in the management of the truck. This plan has proven highly successful.

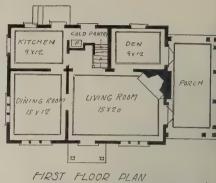
The daily carpenter work report is delivered to the office daily and offers a check on the progress of the work, all notations being in hours. The individual

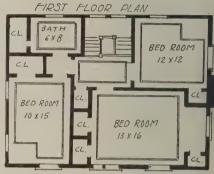


A corner cupboard

weekly time cards are filled in from day to day by the workmen, the foreman signing his initials in the "O. K." column,

The order for changes is designed to reduce the chances for disputes arising from extras. It is a concise statement of what is to be done and how much is to be paid. It is executed in triplicate, one copy for the owner, one for the office, and one for the sub-contractor if one is involved. Form No. 3 is used in con-



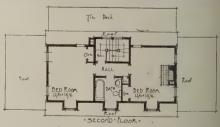


SECOND FLOOR PLAN

The symbol which appears on these forms is one adopted for use on all of the firm's property. It is usually made with two colors—orange and black. All of the equipment on the job is also painted in these colors. Such things as this are of vast influence in giving publicity to a







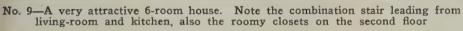
No. 8—Another Dutch Colonial type with an unusual but well-designed plan. This house sits on a high, grass terrace

nection with the order for changes. It gives a complete history of the entire transaction and is attached to the office copy of the formal order.

firm and are prime business getters.

The photographs and sketches accompanying this article give an idea of the work of the organization. They were







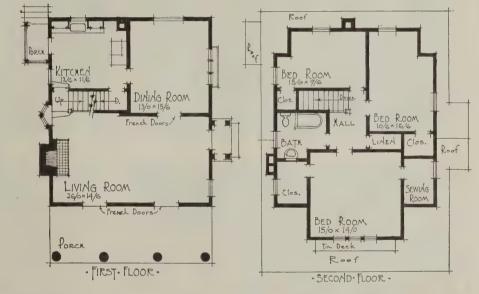
An entrance

selected at random and by no means represent the amount of work that has been carried out by the organization.

When Mr. Moyer first began operations he had many critics who said that his ideas were visionary and could not be put into successful practice. The fact remains that he now keeps about \$20,000 worth of equipment and 70 to 100 men on the jump. More power to visions such as these!

THE BUILDER AND THE HOUSE-WIFE

Under this head on pages 44 and 45 of our September issue appeared valuable suggestions and sketch plans of houses, credit for which was inadvertently omitted. The article and plans were prepared by Mr. R. S. Whiting, architectural engineer for the National Lumber Manufacturers' Association.





Types of construction







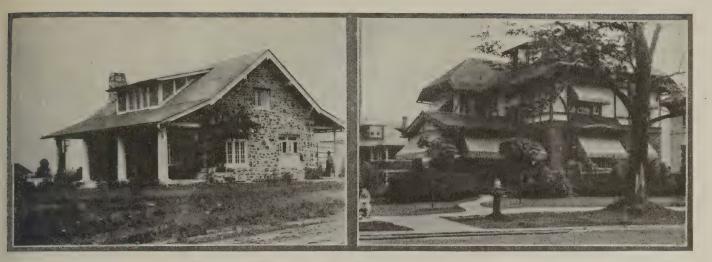






Types of Construction and characteristic interiors taken at random from the designs and buildings of Tilghman H. Moyer as subjects of study for .

National Builder readers



Types of construction—See preceding pages

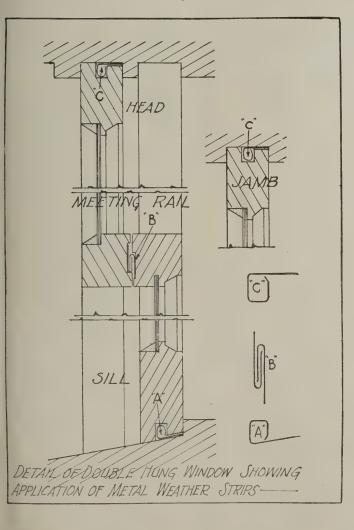
Weather Stripping

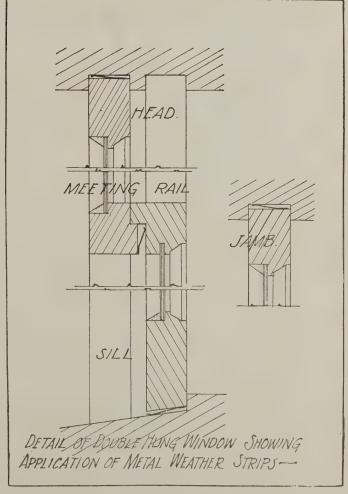
Now Is the Time to Put Forward the Advantages of Weather Stripping—The First Nip of Frosty Weather Gives Your Words the Punch That Brings Orders

ONE of the most profitable side lines for the builder is the installation of weather strips. With the approach of winter this field becomes more important,

and nowadays, after the average house owner figures out his season's coal bill he is in a receptive mood to listen to the merits of almost any scheme that will serve to cut down his expenditure for fuel.

Most of the important manufacturers of weather strips appoint local agents





to handle their product. Only one agent is allowed to work in a given territory and he is given sole authority to apply the makers' strips within that district. Almost any reputable builder who is a live wire can obtain the local agency for a territory in which the manufacturer has no representative. Before applying for an agency the builder should investigate the merits of various types of weather strips and should base his selection upon proven merit. A builder who becomes the agent for any product may look for success only insofar as the product has real worth. If the product is shoddy to begin with, then no amount of care and skill in installing it will make a satisfactory piece of work out of it.

Weather strips have of late years reached a high stage of efficiency, and a new house nowadays is not considered wholly complete unless its exterior openings are fully equipped with these aids to keeping the cold out and the heat in. It is said that an efficient type of weather strip applied to all of the exterior openings of a house offers from 20 to 40 per cent reduction in fuel consumption, and that for a new house that is to be so equipped, the sizes of the heating plant and the radiation may be reduced from 15 to 25 per cent. Thus it is clear that weather strips are desirable not only from a standpoint of comfort, but that they save no small amount of money and a considerable part of the time involved in attending to a heating plant.

Weather strips may be installed in either new or old buildings and in connection with double-hung, casement, or pivoted sash, of wood or metal and of any shape or size. Outside doors should also be equipped with weather strips. A well-made type of weather strip, if properly applied, will give efficient service throughout the lifetime of any ordinary building.

Weather strips serve other purposes besides the weatherproof feature. They reduce the passage of noise, dust, rain and soot, and also prevent the rattling of sash; are an aid to the perfect operation of the window, and insure an even temperature throughout the room.

The essential purpose of a weather strip is to provide and maintain a weatherproof seal around the edges of an exterior window or door opening. It is important that the efficiency of this seal be unaffected by any shrinking or warping of the sash or frame.

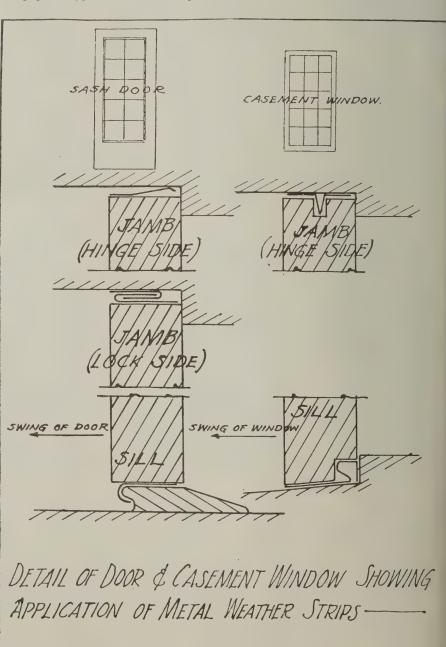
There are various makes and types of weather strips on the market—good, bad and indifferent. Interlocking, two-member types are considered better than one-member types, which merely run in a groove plowed in the sash. The metal member, which forms a lining for the groove in the interlocking type, makes closer contact possible; prevents wear at this point, and keeps moisture from

rotting the wood in the groove. Cloth lined metal strips offer a flexible contact which it is impossible to attain with the plain metal types, but they are not considered so durable. They unquestionably give better protection when new. The cloth lining of these strips should be chemically treated to render them impervious to moisture and should carry a guarantee against rot and mildew, and against tearing, cutting or stretching. Windsor or billiard table cloth or felt are commonly used as lining. Metal weather strips should be made of non-Zinc, copper or corrosive materials. bronze are commonly used for this purpose. Weather strips which cover the entire wearing surface of the frame permit cheaper lumber to be used for the frames.

A popular type of weather strip for

double-hung windows has a combination weather strip and parting bead all in one piece. The wood parting strip is covered with the metal and is thus protected against wear, decay and displacement, and the effects of swelling and shrinkage of this member are reduced. This type is applied with screws and may be easily removed for the purpose of replacing broken glass, sash cords, and so forth The sill piece of this type has a galvanized iron spline folded within the zinc so that it can not be accidentally crushed nor bent out of shape. Another type eliminates the wood parting strip entirely, the latter being formed in the

A highly efficient type for double-hung sash employs the principle of the male and female tube for the jambs. In this type one tube slides within the other



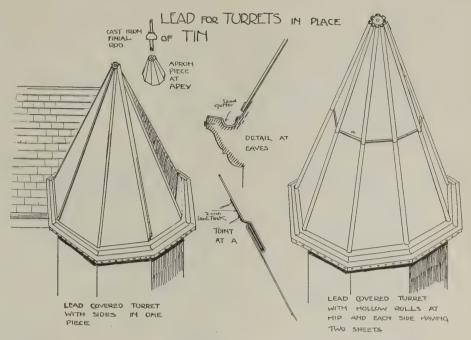
and close contact is always assured are other type has a wooden spline id the within the metal tongue, this reint the ment prevents accidental bendinded in gives a deeper tongue on the strver the furnishing greater protection.

acts as a guide for the door.

Metal -covered, fireproof window with ally have integral weather strip is formedge

That is, the weather strip is formedge

a part of the metal covering itself. the Weather strips should be installed the exact accordance with the manuse. turer's drawings and recommendatic a They should be screwed in place a nailed at two-inch intervals with five eighths of an inch, needle point, barbed flat head, tinned nails for zinc, or with solid brass or copper nails for bronze of copper. The stripping should be continuous around top, sides and sill of the opening.



nosing should the lead flat finish on a sloping roof.

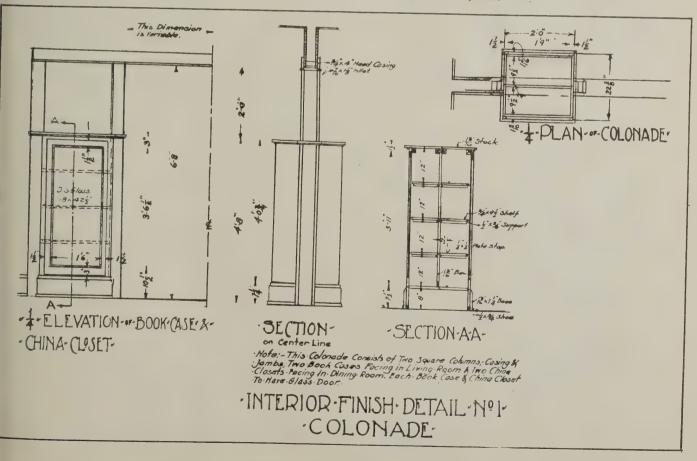
In forming the hollow rolls the two sheets are first dressed up, as shown, ready for folding. When the roll is bent ound and in case of the portion of the tht shown in the sketch this would all done before the slate apron would There shows two examples: A result

I have shown two examples: A small turret which is covered with one sheet on each side and having welt joints at the piends.

The other example has two sheets on each side and is formed with hollow rolls on the piends and a welt joint where the top and bottom sheet mer'

Details of Colonnaud

Courtesy Buckeye Building & Realty Co., Mansfield, Ohio



to handle their product. Only one agent is allowed to work in a given territory and he is given sole authority to apply the makers' strips within that district. Almost any reputable builder who is a live wire can obtain the local agency for a territory in which the manufacturer has no representative. Before applying for an agency the builder should investigate the merits of various types of weather strips and should base his selection upon proven merit. A builder who becomes the agent for any product may look for success only insofar as the product has real worth. If the product is shoddy to begin with, then no amount of care and skill in installing it will make a satisfactory piece of work out of it.

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pands slight, when the temperature is raised, and for this reason it should always be laid in such a way that the joints will allow this slight expansion or will allow it to contract without tearing when the temperature falls.

Lead is suitable in all classes of roof and turrets and can only be supplanted by one kind of material for turret roofs and that is sheet copper.

Sheet copper has this advantage over lead that it is much lighter and thus on a large area would require a less weight of covering material which in the long run means a reduced load on the structure.

In the various sketches I have shown the various uses of lead on a roof are given.

With lead on a wood gutter the class of material which is used is five or six pounds per square foot. This, of course, would be cut in strips broad enough to cover the sole and the exposed parts of the wood and to extend up underneath the slates or shingles.

The length of these sheets would be from eight to nine feet, and where the joints were formed solder would be used.

A sketch of the preparation of one of those joints is shown in which the wood underneath where the sheets meet is hollowed out and the ends of the sheets which just touch are dressed into the hollow.

The tails of the joints are prepared in

rotting the wood in the groove. Cloth lined metal strips offer a flexible contact which it is impossible to attain with the plain metal types, but they are not considered so durable. They unquestionably give better protection when new. The cloth lining of these strips should be chemically treated to render them impervious to moisture and should carry a guarantee against rot and mildew, and against tearing, cutting or stretching. Windsor or billiard table cloth or felt are commonly used as lining. Metal weather strips should be made of noncorrosive materials. Zinc, copper or bronze are commonly used for this purpose. Weather strips which cover the entire wearing surface of the frame permit cheaper lumber to be used for the frames.

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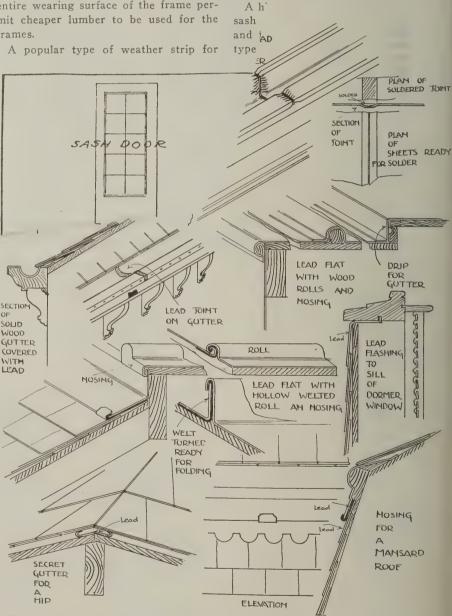
ered w.

against
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double

broken brick chimney the raggle, or The sill scut along the horizontal joints ized irord these raggles are formed in that the highest point from the elimina length.

tirely, metal. lead is turned into the horizontal



Chimney flashing are generally formed in two pieces, the first part laid being the sole, which is turned up against the vertical side of the chimney for about three inches, then over that is placed the apron piece, which in a stone chimney is let into a raggle along a line parallel to the slope of the roof.

raggles for a distance of one-half an inch, but where the lead is cut down from one raggle to another the lead is simply laid against the chimney.

The edge of the lead turned into the raggle is held in position by small lead wedges driven in the raggle and is then pointed with oil mastic.

The same number of pieces of lead are used in forming the junction behind the chimney water tight, but in the front the apron piece is in one, being raggled in along the top edge and dressed over the slates on the lower edge.

In laying lead on a dormer window the side in small windows is often covered wholly with one sheet, in which case the side is just a large apron piece and is brought up under the slates of the roof of the dormer. The same would be said of the dormer front below the window sill, only this time the lead would be brought up under the sill.

Where the lower portion of the front of the dormer window is covered with slates or shingles a lead slate piece is used, as shown, having its upper edge turned along the wood frame of the window and up into a groove on the underside of the sole of the window case.

The most common way to finish a slated hip is to have it covered with a lead roll. In that case the wood piend is formed in a circle on the top edge and projecting two inches above the line of the boarding.

The slates are then fixed close up to the wood piend and the lead piece is dressed over the roll, extending three inches on each side on to the slates.

In cases where it is not desired to show this broad strip of lead running down the hip of the roof the slates are fixed in each course close up to each other and soakers used; that is, pieces of lead sufficiently large to be bent over on the joint of the slates at the piend, so that each piece of lead will lap each other two inches. Another method is as shown with a secret gutter.

This long strip of lead runs from the idge to the eaves and has a lap over nto the gutter. In this way any water which finds its way in at the joints of he slates on the piend will trickle down he lead piece and into the gutter at the aves.

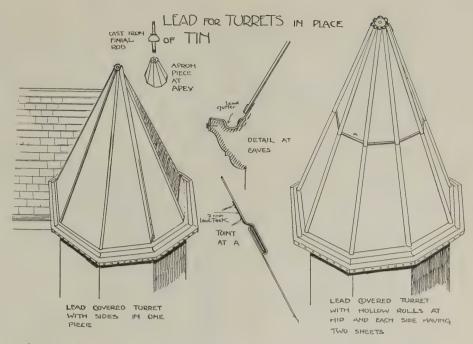
An example of forming a lead nosing or the side of a roof with two slopes shown.

Of course, this is a very exceptional iece of work, but still it shows the use f the two apron pieces and how the lumber can trim this unimportant juncon of a mansard roof.

Lead has been proved to be an ideal laterial for the covering of flat roof roviding the joints are laid to allow a ttle expansion and contraction.

The maximum size of sheets for lead overed flats should be eight feet by two et six inches, and the methods of joint-g should be with wood roll or with the bils formed in the sheet of lead them-lyes.

These two methods are both shown and also the methods of forming the



nosing should the lead flat finish on a sloping roof.

In forming the hollow rolls the two sheets are first dressed up, as shown, ready for folding. When the roll is bent round and in case of the portion of the flat shown in the sketch this would all be done before the slate apron would be put in position.

To form an idea of how the nosing would be formed imagine that you can see the sheets on the flat formed with their hollow roll joints: The ends of these sheets would be projecting past the line of the nosing one and one-half inches and the hollow roll would be formed right out to the end of the sheet. The hollow roll, where it projects past the line of the nosing, would now be flatted so as to form part of the sheet and the finished end of the hollow roll partly dressed up.

The lead clips or trugles would now be nailed on to the sloping roof and the lead apron piece, which would have been dressed up to the size on the flat bit of the roof, slipped into position. This would mean that we have the ends of the sheet on the level roof still projecting past for 1½ inches and we have the top edge of the apron piece turned out in the same direction for 1 inch.

Turn the ends of the sheets round the edge of the apron piece and then fold and dress the nosing in as shown in the sketch.

There are many other little details in construction which could still be referred to, but meantime space is limited, so I shall have to pass over them.

However, there is one very important part of lead roofing which I can not leave out, and that is the covering of turrets with this material.

Plumbers seem to be given this important part of work at all times and the

material used for the covering is lead. I have shown two examples: A small turret which is covered with one sheet on each side and having welt joints at the piends.

The other example has two sheets on each side and is formed with hollow rolls on the piends and a welt joint where the top and bottom sheet meet.

In the first example the gutter piece would be laid right round the eaves of the turret. This would possibly be laid in four pieces with soldered joints; then the sheets would be cut triangular shape and wrought up with a 1½-inch upstand on the one side and a 1-inch upstand on the other.

The 1½-inch upstand is folded over the 1-inch one and the two folded down and dressed to form the welt joint.

The apex piece would be shaped up from one piece of lead and would have a soldered seam at the back. When the apron had been put in position the top end would be dressed in so that the rod of the final would pass down through the turret, and render the junction with the apron piece watertight.

In the second example the gutter piece would be laid in the same way and the joint at A formed as shown in the detail. This would allow the sides of the sheets to be set up the one side with a 3½-inch upstand and the other with a 3-inch. These would be dressed up as shown in the lead flat and the roll formed.

The apron piece would be formed in the same way as the last, only this time it would require to be dressed round the hollow rolls at the apex, but otherwise the detail arrangements are much the same.

Lead roof and turrets, after being laid, should be given a rub of boiled oil, which adds much to the general appearance of the work.

The "Sparrow Jack" House

This Job of Remodeling Is Interesting Not Only Because of the Good Taste Governing the Work But Also in an Historical Sense and in the Humor Incident to Naming the House

MANY people spend a large amount of their time deploring the fact that the modern builder lacks the artistic feeling that guided the workmen of former days. This is in a way true, but these critics should also remember that the average owner is also somewhat deficient in artistic feeling, and that his principal concern is to get into his new building as quickly as possible. If a man wants to move into a house the first of September he will often wait until July 15 before he lets the contracts, and then stand around and nag at the builder, who finds it impossible to do a ninety-day job within six weeks.

On the other hand, the Colonial builder worked in a slower-going time. His clients, as a rule, had a fine appreciation of good design and were far more patient than are those of today. They gained more pleasure from living in well studied houses of splendid construction than they would from bragging to the neighbors that it was built in only sixty-three working days.

Even today, however, there are builders and owners whose relations retain some of the old spirit. As an example, the accompanying photographs and drawings show a remodeling job that was recently completed in Germantown, Philadelphia, Pa. This house is owned by Dr. Thos. A. Cope and was remodeled by L. W. Kitselman. On this job



The "Sparrow Jack" House remodeled. The old house got its name because its garret was used as the nursery of the first English sparrows imported to America in the expectation that they would feed on the caterpillars devastating crops about Philadelphia. Thus a transient plague was exchanged for a permanent one. The sparrows refused to eat caterpillars and now there are as many sparrows as caterpillars

there was evidently the closest co-operation between owner and builder.

The history of the house is unique. The portion next to the street dates back to the time of the Revolution and was built by John Herkeshimer, who served as a blacksmith in Washington's army. Later, the house passed into the hands of John (Sparrow Jack) Bardsley and is locally known as the "Sparrow Jack House."

Bardsley was the man who introduced the English sparrow into America. It was during a plague of caterpillars in the vicinity of Philadelphia that he was commissioned to go to England and to bring back some sparrows, in the hope that they would eradicate the pests. The attic of this house was used as the breeding place for the birds, and from it the first ones were released. From this small beginning sprang the tribe that now chatter in every highway and byway of America. Incidentally, the sparrows refused to eat the caterpillars!

To the builder there are many interesting features of construction in both the old building and the new addition and repair work. At the time Mr. Kitselman began work, the house consisted of only the portion next to the street and this was in a very dilapidated condition. The rear wing is entirely new, but in excavating for this portion of the house, traces of an old wall were uncovered in almost the same position as that occu-

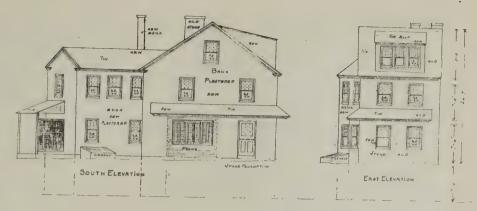


Note the simplicity of the stair design in keeping with the old Colonial mantel

pied by the new work. This leads Mr. Kitselman to believe that at some time there was a wing attached to the main house at about the same angle that he adopted for the new one. At any rate, the setting of the wing at an angle with the main house walls instead of in line with them has a great deal to do with the attractiveness of the result.

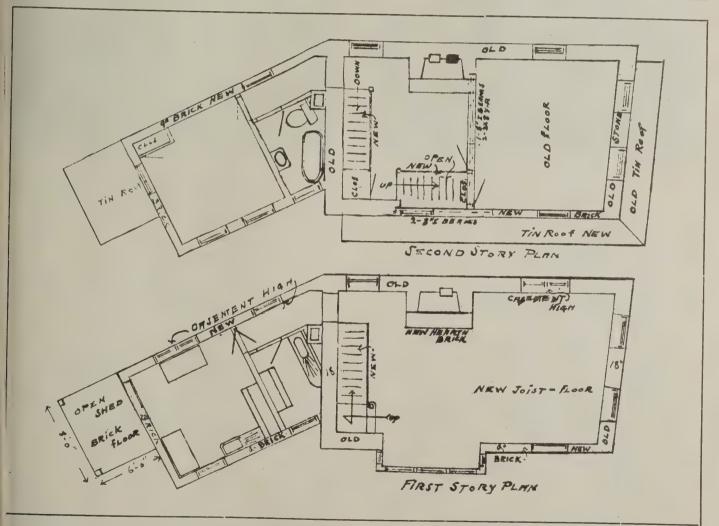
Note also that the street wall of the old house is out of square with the other walls. Such things as this, when not overdone, add immensely to the interest of a building, although it would indeed be difficult nowadays to find a client that would permit such a treatment. There are several places in the second floor where there are slight variations in the floor levels; these were taken care of by ramps.

The mantel in the first floor living room was taken from another old building, but the one in the second story hall



The old walls are of stone and the new ones of brick. The roofs are of tin which still enjoys considerable popularity in this section of the country. There are but four rooms in the house, but the attic could be made into another, and the second story hall is large enough to serve as an upstairs sitting room. The ceil-

graphs. The lesson to be gained is that even today there are opportunities for builders and their clients to work together in much the same spirit that prevailed in former years. The credit for the success of the Sparrow Jack House is equally due to Dr. Cope, his wife, Carra P. Cope, and to Mr. Kitselman.



was made by Mr. Kitselman. This manel is a splendid example of Mr. Kitselnan's feeling for old Colonial work and superior in design to the real Coloial one of the first floor. It offers proof hat the old pride in craftsmanship is ot entirely destroyed.

ings are quite low, being only seven feet six inches high in the first story, and seven feet high in the second. This is also typical of old Colonial work.

There are many other features of this house which should prove of interest to builders who study the plans and photo-

WORKING IDEAS INTO PROFITS

The ideas presented in National Builder are worked into profits by progressive builders, because they are the ideas that have proved successful with others.

A Modern Farm Residence

By I. P. Hicks, Architect

This is a Presentation of One of the Homes Which the Prosperity of the Farmer is Causing to Be Constructed Throughout the Country—The Development of Machinery and Electric Power Gives to the Farmer All the Conveniences of the City

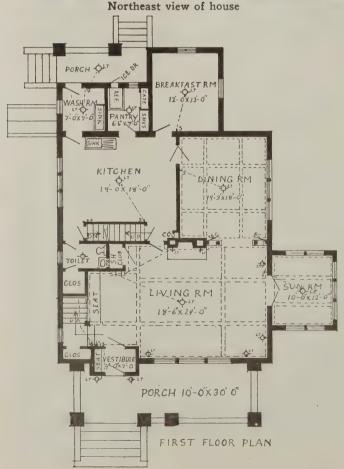
THE following illustrations show the built for Julian Jungbluth, on a farm near plans of a modern farm residence,

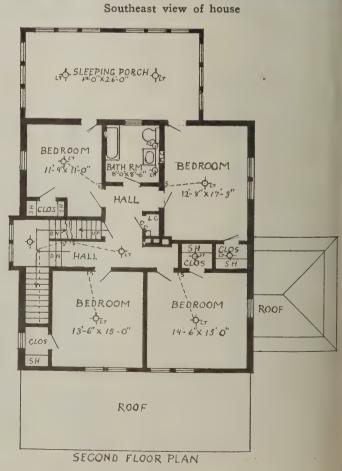
Arlington, Neb.

The house is of hollow tile construction with a stucco, white marble dash













Looking southwest into living room and dining room

Looking north in living room and sun room

finish. The sleeping porch part on the second story is of frame construction, sheathed and covered with stucco board, over which the stucco is applied same as on the hollow tile walls.

The house has all the conveniences of a modern city residence. All the main rooms of the first floor are finished in fumed oak, balance of house finished in yellow pine golden oak finish.

The first floor has a very elaborate living room, dining room and sun room,

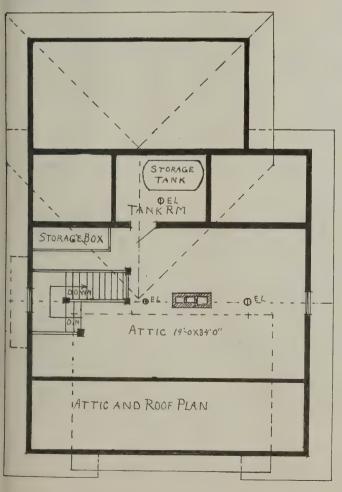
all finished with massive beam ceilings. The interior views show up the beauties of these rooms so perfectly that further description is unnecessary.

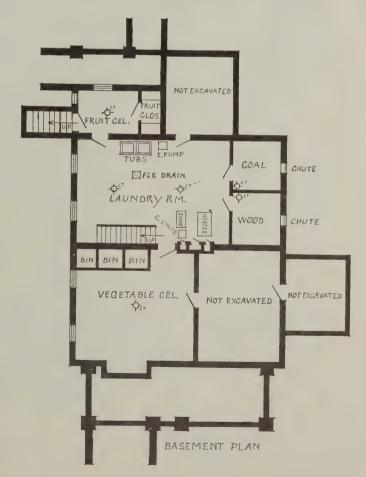
The kitchen is large and roomy, not like the kitchen of a city house where the cook has to back out doors to turn a pancake. There is also on this floor a breakfast room, pantry, wash room, toilet and a plentiful supply of good closet room.

The second floor has four large bed

rooms, all provided with ample closet space. A large bath room with real tile floor and wainscot. Then comes the large sleeping porch which is finished in a way to make it an ideal sleeping room for the entire family. The front stairs go up from the living room and the back stairs from the kitchen, both reach the same landing near the central part of the second floor.

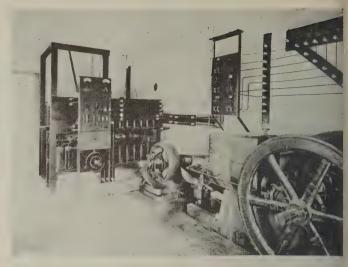
The attic has one large finished room and a tank room for the storage of water











Interior of power house

for emergency use. The main water supply is from a reservoir on a hillside near the house. The reservoir is supplied from a deep well and furnishes the very best of water that Mother Earth can produce.

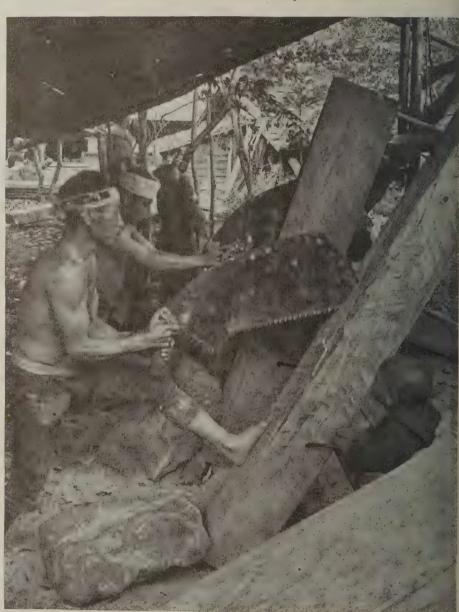
The electric light is supplied from a light and power house located about 300 feet from the residence. The location is central and the light and power house supply light and power for all the buildings about the farm. It is used for shelling corn, sawing wood, pumping water, washing and for everything needed about the place. It is operated with a 12-horsepower gasoline engine. The interior view of this modern farm power house shows the engine, switchboards and the various lines of wires which lead out to the various buildings about the farm. Who can beat it for a farm residence?

Cost of This Interesting Building

Tile\$	885.75
Lumber	1,355.00
Mill Work	1,054.22
Asbestos Slate Roof	610.00
Stone for Window Sills	65.00
Paint	277.68
Lime, Sand, Cement, Plaster	244.54
Hdw., Nails, Window Wghts	234.72
Metal Lath and Stucco Board	95.81
Brick for Fireplace and Fixtures	120.20
Stucco Work	687.60
Heat and Plumbing	3,111.70
Electric Wiring	199.50
Masonry Labor	858.42
Carpenter Labor	1,775.21
Painting, Labor	312.72
Lathers, Labor	46.50
Plastering & Cementing Bsmt	224.00

Total Cost......\$12,158.57

The cost of the paint and the painting may seem high, but the interior walls were a sand finish plaster and the entire walls were painted with the best of wall paint and finished in the best manner.



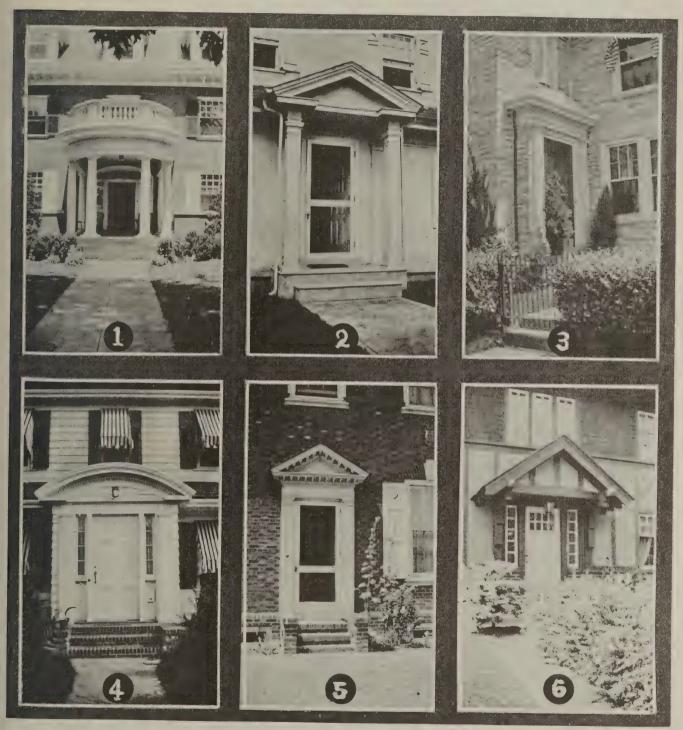
SAWING WOOD AND SAYING NOTHING

walls were painted with the best of wall Japanese converting giant cryptomerias into lumber. Copyright, 1919, Keystone paint and finished in the best manner.

Photo News

ENTRANCES

An Appropriate and Well Designed Entrance Is One of the Most Distinctive Features of a Building—Entrances Here Shown and in Other Issues of National Builder Give Suggestions That Help You to Decide What to Use



No. 1—The Colonial, semi-circular ype. Very effective, but difficult to keep n scale with the average house.

No. 2—Square columns are often leasing, but care must be used to keep hem from looking too large and clumsy.

No. 3—Wood in combination with Pennsylvania split stonework. A pleasing composition tucked into an angle of the walls.

No. 4—A very effective modern Colonial entrance. The curved pediment is

good, but the sidelights look cramped.

No. 5—A side entrance to a large house. A well handled Colonial design, with just enough snap to give it life.

No. 6—A hooded entrance of the English type. Stained woodwork and stucco.

Kitchen Plumbing Equipment

THE proper selection and installation of plumbing equipment for kitchens is of utmost importance to the builder. Attention to details of this sort are the

accumulate. Sinks may be supported on concealed wall hangers or on legs and may be of the roll rim or the apron type. Fig. 1 shows a roll rim enameled sink



Fig. 1—View of a farm house kitchen. The equipment is rather poorly spaced for saving steps for the cook

foundation upon which his reputation is built, and carelessness in this regard is responsible for the failure of many builders to get ahead. This does not mean that the highest type of fittings are to be used on every job no matter how unimportant, but it does mean that a good building should not be slighted in this regard and that any building is deserving of efficient, practical and sightly plumbing equipment and workmanship. Many builders sublet their plumbing work and promptly lose interest in it. In some cases this is due to ignorance and in others to carelessness. In either case the fault may be corrected without much effort, and the builder who has an intelligent understanding of the latest devices and developments in kitchen plumbing equipment will have a valuable advantage over his less aggressive competitors.

Sinks

One of the most important pieces of kitchen equipment is the sink. Sinks come in a variety of styles and types with backs and ends to fit any condition. The best types are made with sink, back and ends in one piece, which does away with any open joints where dirt may

with integral back and double drainboard supported on a leg. Slate slabs are also much used for drainboards. On cheap work, wooden drain boards are often used—Fig. 2. They are not suitable, however, for work that makes any pretense to being first class. This kitchen, by the way, is subject to much criticism. The trim is too fussy and has too many angles and corners, and the small cabinets should run clear to the ceiling. As they are, their tops serve no purpose except to catch dust.

Whenever possible, drain boards should be placed on the left-hand end of a sink. This makes a convenient arrangement for handling dishes. Sinks range in size from 20x24 inches to 22x42 inches over all—the most popular size being 20x30 inches. Backs are usually 12 inches high and drain boards 24 inches long.

Enameled iron sinks are the most popular for ordinary work. Those that are enameled only on the inside are suitable for cheap work, but the outside of these should be painted to prevent corrosion. There is no excuse for using ordinary iron sinks without enamel these days, as the enameled ones are only slightly more expensive and are far superior. Vitreous china sinks are suitable for the highest grade of work. They cost about twice as much as ordinary enameled sinks.

The average sink is a back-breaking device unless the top of the rim is set about 36 inches above the floor, or even higher for a tall woman. This is easy enough with a sink supported on brack-

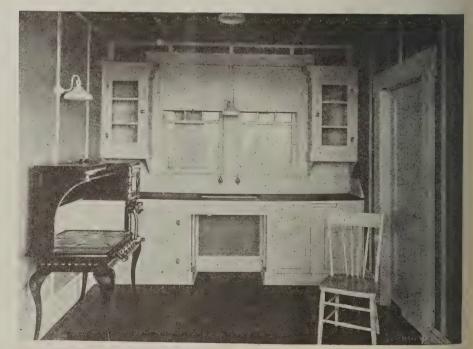


Fig. 2—A California kitchen with the equipment "bunched" at one end. This system helps to reduce the labor of keeping house

ets, but sinks supported on legs usually are designed to stand only about 31 inches high. Some manufacturers now make sink legs that are adjustable for height, but for others it will be necessary to use the special fittings that are made for raising the sink. These special fittings may be used under the legs of any sink.

Sinks should be convenient to the range and be well lighted. A bracket light on the wall just above the sink is convenient. The sink waste should always be led to a grease trap or a catch basin to prevent the grease from clogging the sewer.

One of the latest types of sinks is made in combination with a wash tub. The drain board forms a cover for the tub when the latter is not in use. These save many trips to the basement laundry when there are but a few pieces to be rubbed out. See Fig. 3.

Laundries on the first floor are becoming quite popular in some localities. In many cases the tubs are placed diectly in the kitchen, but it is usually nore satisfactory to have them on the ear porch or at one end of the entry providing the latter can be made large enough.

Sinks, wash tubs, etc., that are placed gainst an outside wall should waste hrough an "S" trap which keeps the pipes inside the room. Supply pipes hould also be run inside, and not in the vall where there is danger of freezing.

Range Boilers

Range boilers for storing hot water nay be had either in the vertical type—tanding on end—or the horizontal type, uspended from the wall or ceiling. The ormer type is commonly used, but the orizontal type is useful when the floor pace is cramped.

Range boilers are usually made of steel r copper, and to insure perfectly clear rater no iron should be exposed inside, nd steel range boilers should be heavily alvanized inside and either galvanized, ainted or enameled outside. Copper oilers should be heavily tinned inside, nd should be reinforced inside with rass rings to insure them from collaps-Iron or steel boilers should be sted to stand a pressure of not less ian 250 pounds per square inch. Coper boilers should be tested for not less ian 150 pounds pressure per square ch. Copper boilers cost more than eel ones and they radiate more heat ad require constant polishing to keep lem looking well. The following table ives the dimensions for the most comon sizes of range boilers. The 40-gal. pacity is the size generally used allough the 30-gal. size is popular for le average house.

Capacity,	Size	Capacity	Size,
Gallons	Inches	Gallons	Inches
30	60x12	63	72x16
35	60x13	66	60x18
40	60x14	82	60x20
48	72x14	100	60x22
52	60×16	120	72×22

Range boilers are usually connected to a coil or waterback in the cooking range in the usual manner. There is also an independent gas water heater or burner attached to the boiler and when the water backs are not in operation or are not adequate to heat the required amount of water, the gas heater takes hold.



Fig. 3—Another kitchen with the equipment well grouped to avoid unnecessary steps.

The window in the cabinet is a good idea

or heating plant, or they are attached to an independent heater. A combination of the two methods is recommended.

Waterbacks have about 110 square inches of exposed surface and will heat about 21 gallons of water per hour to a temperature of 180 degrees—the ordinary desired temperature of domestic hot water—or will heat about 17 gallons per hour to the boiling point. With a hot fire it will heat 27 gallons to a temperature of 180 degrees or 23 gallons to the boiling point.

Wrought iron pipe heating coils will heat from 30 to 40 gallons per hour under same conditions and copper pipe will heat from 45 to 60 gallons for each square foot of exposed surface.

An independent range boiler of an efficient type will heat twice as many gallons per hour as the boiler will hold, raising the temperature from 40 degrees to 180 degrees. That is, a range boiler holding 60 gallons should, under these conditions, furnish about 120 gallons of hot water per hour if such a quantity is desired.

Where fuel gas is available the combination range boiler and gas water heater is taking the place of the plain range boiler. In this method the range, boiler is attached to water backs or coils These gas water heaters are usually automatic in their operation and insure a plentiful supply of hot water at any time night or day, without any attention whatever. Another type is attached directly to the water back of the coal range; utilizing that heat when the range is in use and operating by gas at other times.

There is on the market a combination garbage-burning water heater that offers a practical and convenient means for disposing of garbage. The burning garbage acts as fuel to assist in heating the water.

Automatic water heaters are also made on the coil principle. With this type no storage tank is required as the water passing through the coil to the open fixture is almost instantaneously heated to a high temperature by a powerful gas flame. These heaters are very compact and their growing popularity indicates their practicability.

Hot water heating systems which utilize live steam to heat the water are used on large installations, but are not practicable for ordinary work.

Most of the failures of hot water supply systems are due to improper piping. To insure an immediate supply of hot water at any fixture as soon as the faucet is opened, a circulating system should be installed. That is, a small pipe should be led from the highest point of the system back to the range boiler. This pipe insures a constant stream of hot water passing through the system at all times and is well worth the small added expense. Hot and cold water supply pipes should never be placed less than 6 inches apart to prevent the cold water from becoming warm. Lead pipe should never be used on hot water lines as it is too sensitive to variations of temperature.

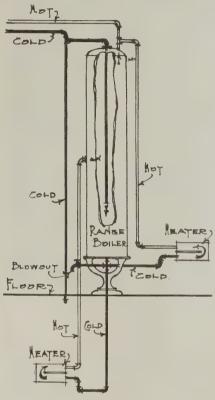


Fig. 4—If the range boiler is improperly connected the builder is due for a panning from the housewife

Fig. 4 shows a combination connection to a range boiler. Gas heaters, water backs or coils may be used at the points marked "heater." In some types the gas heater is directly beneath the range boiler, but the principle remains the same. It will be noted that the cold water supply extends well down into the boiler; this is to prevent the cold water from chilling the warm water, which rises to the top. The hot water pipe at the right side of the sketch rises to the top of the boiler before entering it; this is also done to prevent undue chilling of the water. The method at the left side of the sketch is also used but is not so efficient. Some authorities recommend that when the first method is used a supplementary connection should be made between the hot water pipe and a side inlet in the boiler. This method will prevent live steam from the heater from entering the hot water supply line to the fixtures when the service pipe is cut off. The blowout connection should never be omitted as it is used to drain the boiler of sediment which collects on the bottom.

Refrigerators

Refrigerator traps are designed to prevent any odors or sewer gas from entering the food compartment by means of the drainage system. There are several types in use and any trap that maintains a deep seal is suitable for this purpose.

Fig. 5 shows a popular type which is set in the floor and connected to a waste pipe. The waste pipe should not be connected directly to the house drain but should be allowed to drip over a properly trapped floor-drain or into a laundry tub. Such an arrangement will prevent any possibility of sewer gas entering the refrigerator. The refrigerator trap checks any cellar odors from passing through the waste and into the refrigerator.

In connection with kitchen plumbing equipment it is perhaps well to make note of a refrigerating device which has lately come on the market. This device has been perfected until its use is practicable for almost all except the smallest of homes. Of course, in localities where a refrigerator is used for only a few weeks each year, or in rural communities where ice may be had for the cutting, the iceless refrigerator is perhaps not economical, but as a practical convenience its success is assured.

The cooling devices used for iceless refrigerators are operated by an electric motor and they may be quickly installed in connection with almost any type of refrigerator. One of the latest types which is especially designed for household use, consists of an electric motor, a condenser, an expansion coil and a brine tank. The motor and condenser may be set on top of the refrigerator as shown by Fig. 5 or in any other convenient place. This portion of the outfit is mounted on a base and measures

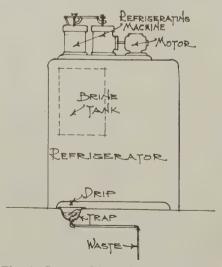


Fig. 5—Some refrigerating machines are built into the refrigerator and the entire outfit is sold as a unit

17 inches high, 11 inches wide and 33 inches long. The brine tank is set inside the refrigerator and is made in several sizes to fit the ice compartment of various sized refrigerators.

The operation of the machine is wholly automatic. It starts when the temperature rises above a certain point and stops when the temperature is again lowered. Ice for table use can be frozen in a compartment of the brine tank. These machines may be installed whereever there is a system of water supply and where electric current is available.

MEASUREMENT OF FLOORING

W. D. asks for the rule for finding the number of lineal feet of flooring required to cover a given surface.

Flooring, other than hardwood or special, as manufactured in the United States, is made from 1 or 1¼-inch stock; 3, 4, or 6 inches wide. If made from 1-inch stock it should finish 13/16 of an inch thick; if of 1¼-inch stock it should finish 1 3/32 of an inch thick. Measured on the face, 3-inch flooring finishes 2¼ inches wide; 4-inch, 3¼ inches, and 6-inch, 5¼ inches.

Maple flooring comes 13/16, 1 1/16, and 1 5/16 of an inch thick, and with 2. 2½, and 3½-inch finish face.

All flooring less than one inch thick is counted as being full one inch in thickness, but a reduced price is made for 3/8 or 5/8 of an inch flooring.

Flooring is measured and sold full size of the rough material. Thus, 13/16 by 2½-inch flooring is counted as 1 by 3 inches in size.

To find the number of square feet of 3-inch flooring to cover a given space, add one-half of the actual area of the surface to be covered; for 4-inch flooring add one-third, and for 6-inch flooring add one-sixth. Thus, a 10 by 10 foot space has an area of 100 square feet. The number of board feet of 3-inch flooring required is one-half of 100 square feet additional, making a total of 150 board feet.

To find the number of lineal feet of 3-inch flooring required, multiply the total number of board feet by 4; or multiply the actual surface area in square feet by 6. For 4-inch flooring multiply the total number of board feet by 3; or multiply the actual surface area in square feet by 4½. For 6-inch flooring multiply the total number of board feet by 2; or multiply the actual surface area in square feet by 3.

Thus in the example above, multiplying the 150 board feet by 4 gives 600 lineal feet of 3-inch flooring required to cover 100 square feet of surface. Multiplying the actual surface area, in this case 100 square feet by 6, also gives 600 lineal feet. Either method may be used for any problem which may arise in the connection.

Hollow Tile Garages

ONE of the most desirable materials for building garages is hollow tile. It gives a wall that is fully fireproof. It

type is becoming more general every day.

Many builders seem to think that con-



No. 1—An attractive two-car garage with hollow tile walls and stucco finish. The roof is asbestos shingles and reduces the fire hazard. Note the large number of windows which afford excellent light and ventilation

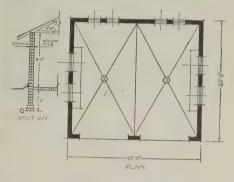
lays up rapidly and requires no expense for upkeep. It is adaptable for use in carrying out any style of design, and its air spaces afford considerable insulation

PLAN

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gainst heat and cold. It is now availple in almost every section of the couny and its use for buildings of this struction with hollow tile requires some special training and that the laying-up of this material is only to be done by men who have undergone certain special training similar to that required to make a good bricklayer. This is not the case. Any man who can lay brick or stone

can lay tile. It may take him a day or so to get the knack of handling this new material, but the mechanical processes are exactly the same that he uses in laying up brick. In fact hollow tile is made from clay just the same as brick and is burned in kilns in precisely the same manner. About the only real difference in the two materials is the fact



that one contains air spaces and is larger than the other. This difference in size makes the hollow tile wall lay up faster and in the long run it will be found that although hollow tile as a material costs more than brick the saving in laying it in a wall just about equalizes the total cost so that the unit costs per square foot of wall are almost the same.

For those who have not had any experience with hollow tile a garage will be a good place to try it out. On such a small piece of work there would be no chance of losing any great amount



No. 2—A one-car garage with stucco and half-timbered finish. This one has a slate roof and is designed to harmonize with the house. The plan is exceptionally roomy and provides for a heater and a toilet. It is usually cheaper and safer to run a heating line from the house to provide for garage radiators



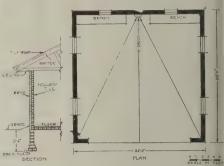
No. 3—Two-car garage with brick veneered walls, stone trim and tile roof. There is almost enough space for a chauffeur's room under the roof if it were desired. The half-timbered gables harmonize with those of the house

of money, even though that remote possibility suggests itself and it will furnish a good place for the workmen to become accustomed to handling it.

The page of details which accompany this article cover about every structural problem that is likely to arise in connection with a small garage, and in fact the most of them are suitable for use in any hollow tile building of moderate size. It is suggested, however, that concrete footings be substituted for the tile shown in No. 1 and No. 2. It is also advisable that vitrified tile be used for all walls below grade, as the softer tile is likely to become soft under the action of dampness. In connection with No. 5 it is suggested that steel or reinforced concrete lintels be used where the clear span of the opening exceeds four feet.

The floor should be of concrete about four inches thick with a three-quarter inch finish coat of cement mortar. The floor should be five or six inches above the grade level with a slope down to the grade at the doors.

If the cars are to be washed inside the garage it will be necessary to set a bell trap in the floor and give the floor

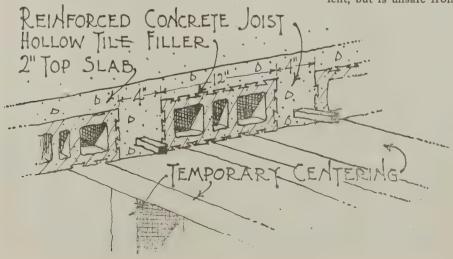


a slight pitch toward the trap. If the cars are to be washed outside it will be necessary to build a cement platform so that a mudhole will not be formed at the entrance.

The windows in a garage should be set low enough so that plenty of light

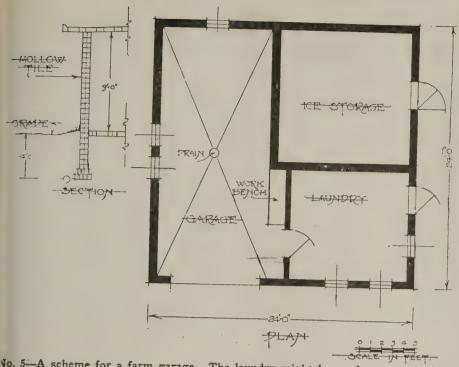


No. 4—Another brick veneered one. The roof is entirely of wooden construction and increases the danger of fire. The covered passage-way to the house is convenient, but is unsafe from a fireproofing standpoint



for the owner to see how to work is thrown on the lower part of the car. Ar electric outlet with a two-way socked should be set in the wall—preferably just above the work bench—instead of in the center of the ceiling. A work bench should be built in and it is desirable to have a locker for overalls, robes, tools etc. A hose bibb should always be installed in a convenient place so that it will be readily available for washing down the car and for use in case of fire

A gasoline storage tank is also useful The tank should be buried in the ground at least ten feet away from the garage with not less than two feet of earth above it. A pump located in the garage will supply the car with gasoline



No. 5-A scheme for a farm garage. The laundry might be used as a work shop. The hollow tile walls are naturally suited to the purpose of an ice house

A great deal is said about the fireroof qualities of hollow tile, and yet lmost every garage has a wooden roof. A great many people seem to believe hat if they build a fireproof wall some ct of providence will take care of the oof. A fireproof roof for a garage is

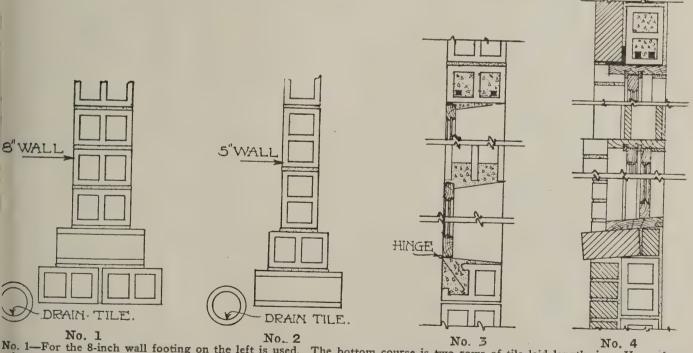
just as feasible as a wooden one and if built of reinforced concrete joists with tile fillers it will cost only a little more than the wooden one. These roofs are comparatively easy to build and require very little form work. The accompanying sketch shows the principal features of

their construction. For spans up to fourteen feet, tiles four inches thick with one five-eighth inch square bar in each joist will be sufficient. For spans up to twenty feet, six-inch tiles with seven-eighths inch square bars in each joist should be used. In every case the two-inch top slab must be cast at the same time that the joists are poured so that they will act together. One-fourth inch bars should be laid in the top slab about two feet apart and at right angles to the joists. These bars are to prevent temperature cracks.

The roof should be sloped the same as any flat roof and covered with tar and felt. In laying the felt the concrete is first mopped with hot tar and the first layer of felt bedded in it. The succeeding layers of felt are laid in the usual man-

In case it is desired to use wood framing for the roof the outside covering at least should be fireproof. Slate, tile, asphalt shingles, or any similar material should be used. This will prevent any fire originating on the outside from entering the garage, thus affording some fire protection, although of course it will not prevent a fire inside the garage from spreading.

The interior walls and ceiling should not be plastered, as plaster is apparently affected by gas fumes and will not prove durable under such conditions. Old fashioned whitewash makes a cheap and highly satisfactory treatment for garage



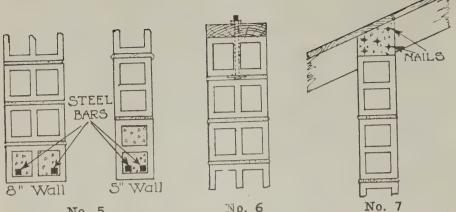
No. 1—For the 8-inch wall footing on the left is used. The bottom course is two rows of tile laid lengthwise. Upon them tother row is laid crosswise. This completes the footing and the wall above is laid as shown. This footing is also used for te 9-inch wall of brick backed with tile.

No. 2—Shows the footing for the 5-inch tile wall. Bottom row laid crosswise, on this a row laid lengthwise flat, and the fill completed as illustrated.

No. 3—This shows a cheap and good method of placing a sash in a masonry wall without a wood frame. The hinges are need permanently between the blocks at the lower part of the opening. The sash is beveled as shown in the drawing, and the soulder against which the sash closes is simply plastered on the tile after the sash is in place.

No. 4—This illustrates a two-sash window in a brick and tile wall. The tile beam is shown, as described in No. 5, and also

ere is a steel angle to support the brick over the window.



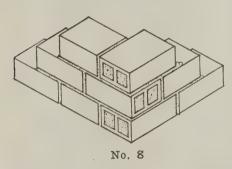
No. 5 Over the door and window openings a beam two feet longer than the width of the opening is placed. This beam is made by standing tile end to end on sloping plank, placing steel rods in one of the air spaces, as shown, and filling both spaces with concrete. Openings 4 feet wide or less require two 3/8-inch deformed bars. Openings 4 to 8 feet wide require two 5/8-inch deformed bars. These figures are for the average sized garage or small building.

No. 6—A wall plate on top of an 8-inch wall, made by laying a 2x8-inch plank on

the wall and extending a ½-inch bolt, with a large washer on the bottom end, down between the tile. For a 5-inch wall, a 2x4 is fastened in the same manner. The

rafters can be cut and nailed to these plates.

No. 7—Shows a method of cutting the rafters to bear directly on the tile wall. Nails are driven into the sides of the rafters and bedded in concrete.

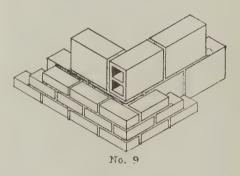


No. 8-This cut shows the method of laying the corners. The corner tile are first stood on a board or level ground and partly filled with concrete.

interiors. Wooden ceilings are sometimes used, but they increase the fire hazard and are dangerous on that account.

In building garages it is well to recommend that a two-car size instead of a single one be built. The larger size costs but slightly more and gives extra space that may be used for a guest's car, for rental purposes, or as a storage place for garden tools, etc.

The exterior surfaces of tile may be finished in various ways. In some cases the tile is left exposed without any surface treatment, and vines are trained to run on the walls to relieve their somewhat crude appearance. The most usual treatment, however, is stucco. The tiles come grooved to form a key for the stucco and a wall of this kind will be durable and attractive in appearance. Half timbered effects are popular; the boards being secured to wooden plugs inserted in the joints at proper intervals. Brick veneer on tile is also favored by



No. 9-Illustrating proper laying of brick and tile corner. In the 5-inch tile wall without brick, the end blocks are filled as in No. 8.

many builders. The bricks are secured to the hollow tile by means of metal ties in a manner similar to that employed for brick veneer on wood frames.

The surface treatment to be employed is, of course, determined by that of the house itself. The garage should follow the general lines of the house and seem to belong to it. A house of one type and garage of another can never make an attractive composition.

GOVERNMENT TESTS OF WIRE ROPE

No. 121 of the technological papers of the Bureau of Standards has just been issued. This pamphlet sets forth the results of tests and experiments made to determine the strength and other properties of wire rope. It is for sale by the Superintendent of Documents, Government Printing Office, Washington; price 20 cents.

GLUING WOOD COATED WITH VARNISH OR SHELLAC

Glue joints between wood surfaces which have been coated with shellac or varnish have low or very erratic strength. This has been thoroughly demonstrated by a recent test at the Forest Products Laboratory, Madison, Wis. Sixty pairs of test blocks were prepared in which one or both wood surfaces were varnished or shellacked and were joined with either casein or animal glue. A great many of these blocks fell apart before testing, and all which held together long enough to be tested sheared apart in the glue joint and not in the

The highest strength value obtained was 1712 pounds per square inch, which is low for casein glue. The other values were 1000 pounds per square inch or less. It is evident, therefore, that al shellac or varnish should be carefully cleaned from wood which is to be glued if high strength is desired.

A few blocks were joined using shellar as a glue over surfaces previously coated with shellac. The maximum shear strength obtained was 1425 pounds, the minimum 450 pounds, and the average 758 pounds per square inch. These val ues are low and do not indicate tha shellac has gluing properties which com pare favorably with casein or anima glue.

PERMANENCE OF WOOD

Beneath the foundations of Savoy Pal ace, London, oak, elm, beach and chest nut piles and planks were found in state of perfect preservation, after havin been there for 650 years, says the Tim berman. While taking down the old wa of Tunbridge Castle, Kent, there wa found in the middle of a thick stone wa a timber curve, which had been enclose for 700 years. Some timber of an ol bridge was discovered while digging for the foundation of a house at Ditto Park, Windsor, which ancient record incline us to believe were placed the prior to the year 1296. The durabilit of timber out of ground is even greate still. The roof of the Basilica of S Paul's at Rome was framed in the yes 1818; and now after more than a thosand years, it is still sound, and th original cypress wood doors of the san building, after being in use more that 600 years, were, when replaced by othe of brass, perfectly free from rot or d cay, the wood retaining its original ode The timber dome of St. Mark's, Venic is still good, though about 900 years of The roof of the Jacobin Convent Paris, which is of fir, was executed abo 500 years ago.

The Arrangement of Round Barns

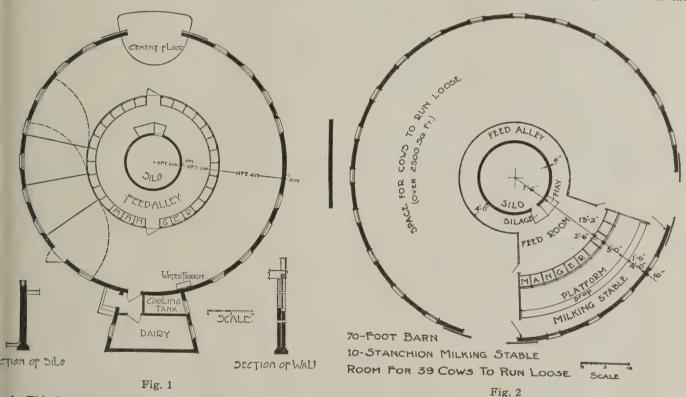
This Article on the Arrangement of Round Barns Supplements the Article in National Builder for September in Which the Merits of Round and Rectangular Barns Were Discussed

THE actual arrangement of any barn is, of course, dependent on the paricular purpose for which it is intended. The average builder is more concerned with fulfilling the particular requirements of the farmer by whom he is engaged can he is in poring over more or less neoretical "model" barn plans. The fact remains, however, that a great many armers (and most of the rest of us) the not always exactly sure just what really desired. To provide for such

were discussed. In that discussion, among other advantages, it was brought out that in point of economy of material and of labor the round type is the superior. It is not wise, however, for a builder to conclude from these observations that the round barn will entirely displace the rectangular type. The latter type has its own particular advantages, not the least of which is the fact that years of satisfactory use have given it a well deserved prestige among farmers. The modern

its methods, and may be considered an authority in its field.

The first consideration in planning a round barn is the arrangement of the floor space in the stables. The simplest type of plan for a dairy barn is that shown in Fig. 1. In this plan it is intended that in bad weather the cows will run loose in the barn except during feeding and milking time. This method has been objected to on the ground that the cows become dirty and affect the



1. 1—This barn is 60 feet in diameter with 2,200 feet of floor space. Cows run loose, except at milking time. There are achions and mangers for 28 cows. The gates hinged to the wall of the barn are swung to the mangers when box stalls are ded. Fig. 2—Combines the advantages of a separate milking stable and running the cows loose

asions it is necessary for the builder have a thorough understanding of the ciples involved in barn planning so he may offer practicable suggestions he proper manner in which the speproblem may be solved.

he round barn in its perfected shape of such comparatively recent origin it is a distinct novelty in many secsof the country. In a previous issue NATIONAL BUILDER (September) the arent advantages of the round barn the more familiar rectangular barn

farmer, though, is nothing if not progressive, and the wise builder will prepare himself accordingly, because any day he may expect to receive an order from an up-to-date farmer for a round barn.

The accompanying plans and much of the data on round barns were furnished by the Agricultural Experiment Station of the University of Illinois, Urbana, Illinois. This institution is noted among the farmers, whom it serves, as being thoroughly practical and up-to-date in quality of the milk. Sufficient bedding will largely overcome this objection, and there is no doubt that the cows are more healthy, contented and productive when they are allowed to run loose. In this method the manure is usually allowed to accumulate and is loaded directly into the spreader and removed from time to time, thus saving the labor of daily cleaning. Slat gates at the large doorway will provide plenty of fresh air and sunshine without putting the cows outside in cold or muddy weather.

The placing of the silo in the center is a characteristic of round barn planning. This location uses up space that would otherwise be of little value, and is of distinct advantage in saving time

and labor of feeding the stock.

Fig. 2 is a modification of Fig. 1. A portion of the space is partitioned off to form a milking stable.

Provision for filling a silo that is lo-

cated in the center of a round barn is readily made by a drive through the second floor. This method lessens the height to which the silage must be raised and permits the running of the cutter

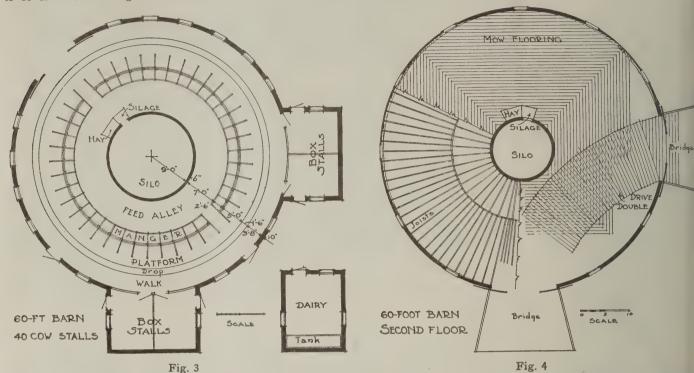


Fig. 3—Box stalls arranged under the driveway approaches to the second floor. The dairy room is built separate from th barn. To supply this sized herd and the necessary young stock with silage for 8 months would require a 370-ton silo, or on 18 feet in diameter and 56 feet deep. With a 7-foot feed alley and a 2½-foot manger, the circle at the stanchions would be 3 feet in diameter, or 119½ feet in circumference; allowing 4½ feet for 2 passageways, the stalls would be 2 feet, 10½ inche wide at the stanchions, and 3 feet 6 inches at the top. Fig. 4—Radial arrangement of second floor joists. The number of joists under the drive is doubled. The mow flooring is 1x8-inch shiplap laid in four directions. The floor of the driveway indoubled

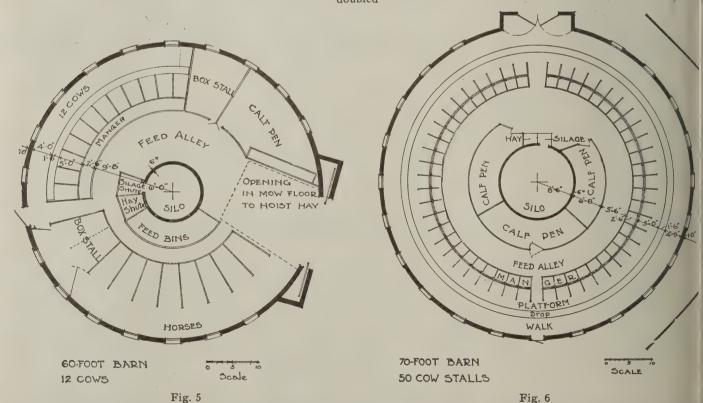
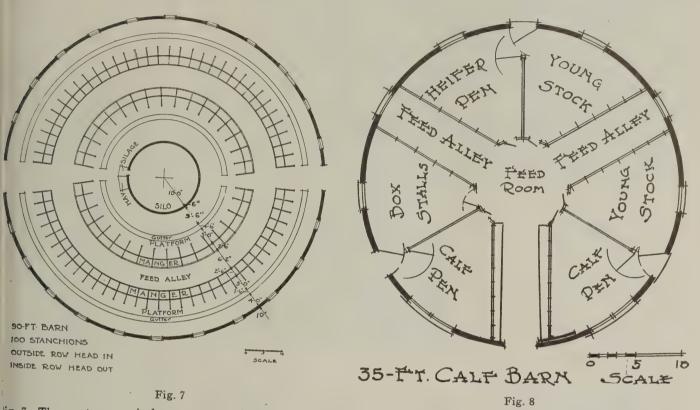


Fig. 5—General purpose round barn. By removing the box stalls the number of cow stalls may be increased to 20 and stile leave room for 8 horse stalls and a calf pen. Fig. 6—Using the space about the silo, in a 70-foot round barn, for calf pen

belt out through one of the driveway doors. It also gives all of the first floor for the use of the stock. Grain bins next to the silo on the stable floor should be placed on the same side as the mow floor drive so that they may be filled directly from the wagon when it is driven in above. In employing the mow floor

making a very desirable arrangement for many farms. The central space may be divided into box stalls, feed bins, tool rooms and so forth, if desired. This barn has a drive to the mow floor and provides for fifty cows. An eighty-foot barn of this type should accommodate fifty-eight cows.

stalls, the stalls of the inner row will have the narrow portion at the backs of the cows. This, of course, causes some waste space, but as this circle contains but a small proportion of the stalls, the lost space will not amount to much when the economical shape of the stalls in the outer circle is considered.



ig. 7—The most economical arrangement of stalls in a two-row round barn. Fig. 8—Calf barn 35 feet in diameter. The pens accommodate 14 calves, 12 head of young stock, and 10 yearling heifers

rive scheme it is customary to build the alls of masonry up to the mow floor vel, with twenty-foot studding on top I this.

Fig. 3 shows a stable floor arrangement which box stalls are placed under the ive approaches to the mow floor. The ox stalls might be replaced by milk oms and so forth if desired. Fig. 4 is sketch showing the framing plan for e mow floor of such an arrangement. Fig. 5 shows an arrangement for a kty-foot general purpose round barn. his type has special value for the frmer who begins with a small herd. s the herd increases, the box stalls, off pens and so forth may, from time to tne, be replaced by accommodations for te cows, ultimately raising the stable pacity to forty head. It will be noted tat this plan provides a drive on the sible floor. This is not so desirable a ethod as the one which employs a mow for drive, as it not only uses valuable for space, but the empty wagons must backed out of the barn.

Fig. 6 shows an arrangement for a strenty-foot barn in which the space bund the silo is used for calf pens,

Fig. 7 is a scheme for a ninety-foot barn which will accommodate 100 cows. Two rows of stanchions are employed: the outer row facing in and the inner row facing out, with a convenient feed alley between the two rows. This type is highly economical and efficient for a large dairy farm.

Fig. 8 shows an arrangement for a separate calf barn. Many other arrangements can be worked out along this line.

Stalls for stock vary according to the size of the animals, but for Holstein cows the width at the gutter is usually made from 3 feet to 3 feet 4 inches in width. In round barns the stall divisions for cows facing inward are narrower at the manger than at the gutter, but this conforms to the wedge shape of the animal and is really an advantage. In a seventy-foot barn, a foot saved in the width of the walk behind the cows will make possible the addition of more than two stalls in the circle. This shows the importance of keeping the stalls as near the outer wall as possible, but the walk behind the cows must not be so narrow that it becomes cramped or inconvenient.

In a round barn having two rows of

Hay tracks for round barns are usually of the circular type upon which a swivel truck carrier is used. These must be carefully installed so that the guide rollers are at the proper angles to keep the guide rope in alignment. In barns having no silo in the center a three-way V-shaped, straight track is often used. Sometimes a combination straight and curved track is employed; in fact, the type of hay track depends entirely on the conditions that are to be met and the preferences of the farmer.

In barns which have no second floor drive, the hay may be taken up through an opening in the mow floor as in Fig. 5, or a dormer-like opening may be provided in the roof and the hay taken in from the outside.

MAKING THINGS GO

Take hold of your building proposition only after you have planned it well. You may get tired thinking out plans and feel that you will meet doubtful places as you come to them You may then find that you can neither go forward or back without loss. A job well planned is half done.

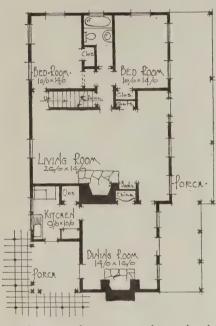
Country Homes for City Folks

COUNTRY homes are becoming increasingly popular among city people. A few years ago it was considered that only the wealthier class could afford

we may expect that more and more of this type of house will be built every year.

The builder who sets himself to create

the mention of a country home thinks of it as a sort of a show place to be occupied during a few weeks in midsummer and closed during the remainder of



the pleasure of a separate home in the country; but lately many city people of



Plate 1—This house has all the charm of the old New England farmhouse. It has a simple dignity that appeals to the "tired business man"



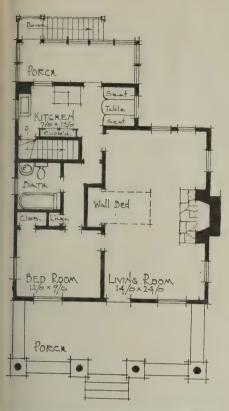
Plate 2—The old trees give this new house an appearance of age that renders it more homelike

moderate means have built homes in the country, and as the practicability of this idea becomes more generally understood,

business instead of waiting for it to come to him is a student of conditions. He knows that the average city dweller at the year. To his manner of thinking, country houses are listed along with private steam yachts and similar luxuries of the opulent. But the builder can show the prospective client of moderate means that it is quite possible for him to have a country home at an expense little, if any, greater than his present method of living, and that increased efficiency and the improved health of his family should more than overcome any slight additional expense, which, indeed, is usually met by other economies not possible to the city dweller, in the way of the produce from a garden, fruit trees, fowls and domestic animals. The automobile has



brought the country nearer to the city also; and there are, in normal times, plenty of opportunities to rent apart-





Rear view

nents in the city during the winter nonths, when the country home may be losed up. There are also those city wellers who spend their winters in lorida or the Pacific Coast, who are villing to rent their apartments at modrate figures for the sake of occupancy nd caretaking. Of course, there are lenty of city people who occupy their ountry homes the year around, espetally if the transportation facilities are xceptionally good. The scheme outned above, however, seems the most wored one.

The same amount of money that would e required to buy a desirable lot in the ty will usually buy several acres in the puntry. In many cases several conenial friends can go in together and many a small tract of ground and all build the women folks. In any case, the nd should not be too remote from other buses, as a woman who is accustomed city life will become unbearably lonely she has no near neighbors. The land tould be easily accessible either by train automobile, and should not lie more



Plate 3—Field stones and stucco give the rustic appearance that is favored by many people

than an hour's ride from the owner's place of business. Long rides back and forth will take all of the pleasure out of living in the country.

So much attention has lately been given to equipment for country homes that the city man need have no fear that such a home will require him to give up any of the conveniences to which he is accustomed in his city home. Automatic refrigerating machines of moderate cost and high efficiency make the ice man unnecessary. In case electric power is not available for operating a refrigerating machine, he can build an ice house and store a season's supply during the winter. Small electric plants are now available for country house lighting, and may be operated very cheaply. Acetylene gas plants are also used for lighting. Pneumatic systems of water supply have reached a high stage of development and will insure an adequate supply of fresh water at all times, making possible the use of modern plumbing fixtures throughout the house. The sewage can be disposed of by means of a septic tank-a very ingenious and easily built apparatus which removes and destroys all of the objectionable waste matter of the sewage.

The houses which illustrate this article are located near Stamford, Conn. They are owned by people whose work lies in New York City, people who feel that they can do better work if their home life is rendered more simple than is possible in a city. None of these houses are pretentious, all are simple and inexpensive. With a few modifications the plans could be adapted for real farm homes. In each of the plans, all of the rooms lie on one floor; in this respect they resemble the bungalow type, and to the builder of bungalows they offer many ideas and suggestions.

HOW TO SQUARE UP STOCK IN WOOD-WORKING

Just as a surveyor has certain points to which he refers all other observations, so the wood-worker has two—the first broad surface that is planed, and the first edge. The first surface he calls a face side, or a working face, and the first edge he calls a face edge or a joint edge. After he has planed these to meet certain tests, he marks them with face marks to distinguish them from other surfaces that will be planed later. These are the only surfaces that are marked. All tests of other surfaces and ends are made from these, and from these only.

Select for the first surface the broad surface that best meets the use to which the piece is to be put.

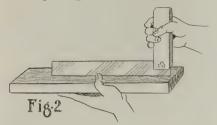
With one eye closed, sight the surface for evenness, both along and across the grain of the wood. Look also to see whether there are twists or "windings." If they exist, the back edge will not line up with the front. These sightings will give you a fair understanding of what is needed to make the piece true.



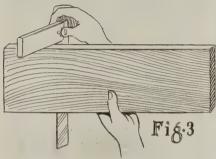
Take a position as in Fig. 1, and plane the first broad surface, sighting frequently as the work proceeds. A beginner will find it advisable to follow his sightings with a straight-edge test. Anything that has a straight-edge will serve as a tool—a plane or try-square blade. Place the straight-edge along the two diagonals, then lengthwise, then cross-

wise, and look to see if any light shows between the surface and the straightedge, as in Fig. 2. If none shows in any of these four tests, the surface may be considered true and level, and may receive the face mark.

After planing the face edge, hold the



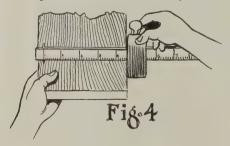
try-square, as in Fig. 3, with the beam or handle firmly against the face side, and test the edge to be planed at a sufficient number of places, until you know what it needs to make it square to the



face side. Also, sight along the length for straightness. Plane the edge in accordance with these tests. Two tests are needed for this edge before it receives the face mark; a test for squareness with the try-square held as indicated above, and the test for straightness. Beginners should make the test for straightness with a straight-edge, although experienced wood-workers seldom need to do so.

The second edge, like the first, must be straight and square. It must have a definite position with reference to the first edge. This position is marked by means of a tool called a marking-gage. Holding the piece of wood and the gage as in Fig. 4, mark off the width of the piece. Make certain that the gage head or the block is against the face edge. Plane carefully to this gage line, and test frequently with the try-square as you approach the line. If you do the gaging correctly and carry the planing just to the gage line, the second edge will be straight.

To plane the second surface, set the



gage for the thickness desired, and holding the gage head against the face side, gage lines on each of the edges. Plane the second surface to these lines, testing across the width with a straight-edge as the planing proceeds, in order that the middle may be neither high nor low when the lines are reached.

In end planing, the cutter or plane-iron must project but slightly, must be very sharp, and can not be run over the edge or it will splinter the wood. To avoid this, plane only two-thirds of the way across an end; then reverse the piece or your position, and plane from the second edge two-thirds of the total distance.

Ends must be squared to face side and face edge. You test them by holding the blade of the try-square across the end with the beam first against one face, then against the other.

The second end must have a definite location with reference to the first. With the rule, measure the length desired. At the point so marked score a line across the faces at least. It may be well for the beginner to carry the line entirely around. After you have removed most of the surplus stock with the saw, plane carefully to these lines. Tests for this second end are the same as for the first.

—F. H. Sweet, Waynesboro, Va.

The High Cost of Building



ONE of the contributing reasons for the high cost of building is due to carelessness in handling materials on the job. Materials should be sheltered when possible and should always be neatly stored and piled so that they may be quickly available for use. ...

The accompanying illustration shows a small portion of the lumber that is to be used in the construction of a large apartment house. It looks more like a refuse heap than a pile of new material. Lumber of all sizes is dumped together without any thought of arrangement or order. To find any certain size of board in this mixup is about equivalent to searching for a needle in a haystack, and the proportion of broken and warped pieces will be unnecessarily high.

Such carelessness as this not only costs money on the job in hand but creates a bad impression on the passer-

by who may be a potential client who is led to believe that a builder who does not use good judgment in his own affairs is not likely to prove to be the best man to have on a job.

PAINT NOW

Paint is a preservative first and a decoration second. This fact is commonly forgotten by those who defer painting until the spring, reasoning that the house will look fresher at that time than it painted in the fall. Fall painting is done on surfaces that are dried out with the summer heat. Cracks and crevices can be caulked better because they are more open and obvious. The moisture is not in the wood in the fall and painting keeps it out during the wet winter months. It the spring the wood is likely to be sodden with moisture. Painting seals the moisture in. Paint now.

Sidelines for the Contractor

You Will Always Find Something Profitable to Do, Mr. Builder, if You Will Keep Watching for What Should Be Done and What Others Are Doing, and National Builder Helps You to Do That

RECENTLY, during a strike of carpenters in a small, middle-western town, one of the contractors doing business there discovered that he could keep his gang of cement workers busy day after day performing odds and ends of work that produced for him a good revenue, and kept his men busy.

This builder had always been a live wire. When circumstances beyond his control stepped in and caused his business to stop, instead of sitting back and waiting, he scouted around to see what he could find to do. He was surprised



Fig. 1. Cement steps and buttresses are popular with owners because they eliminate the repairs required for wooden steps. This illustration shows a good way to do it. Cement urns are often used on top of buttresses such as these

to learn that there is much work in every town, work that ordinarily is not done, or, at best, is done only at the last minute when owners become suddenly aware that it is needed.

"I found," said this contractor, "that there are hundreds of houses needing repairs around the foundations, repairs that prove profitable work for any builder if he can only get the work to do.



Fig. 2. With a bank of earth around the house cement steps are a necessity. This old house was remodeled and new cement steps were built in place of the old wooden ones; good business for the contractor as well as the owner

"When the strike started we expected it would be over in a few days, but it

soon became apparent that the men would not go back to work so readily, and a fight was on our hands. Naturally, I was at a loss to know how to keep my business going with no carpenters to be had, and hit upon the idea of trying to keep my cement workers busy, with a view of making enough profit to at least pay my overhead.

This enterprising builder made a detailed canvass of the town for sidewalk work. He had an experienced gang of five men with a capable foreman. His equipment consisted of a good cement mixer and all the necessary tools to execute sidewalk and general cement work and he found immediate opportunities to get cement work at a fair profit.

Among other things he proved that cement steps are in big demand. It was comparatively easy to convince house owners that now was a good time to get rid of old wooden steps which were wearing out rapidly and would soon be in a state requiring expensive repairs.

Other contractors have made the same discovery; that there is plenty of work in every town just waiting for some enterprising builder to promote.

Cement has probably had more publicity than any other material. It is now so well known as an enduring, economical building material that it is no longer necessary to argue about it. Every house owner knows without urging that cement is more enduring for steps and walks than wood, and old-fashioned



Fig. 3. Cement approach for an expensive brick house. This type of work is a valuable asset for the contractor because viewed by the general public. The contractor's name should be stamped in the cement



Fig. 4. Cement flower boxes are much in vogue with architects who welcome the use of flowers about house and grounds. Builders can build up a good side line in flower boxes

houses which have been standing for a number of years prove a ready field for the endeavors of the repair gang.

About the most modest work for the cement gang, in addition to sidewalks, is garage floors for new garages or old. Many builders have found a good side line in converting old barns into garages, and much of this work consists merely in putting new cement floors into these after tearing out the old wooden floors.

Many of these old barns stand on old wooden posts so that when the new cement floor is laid most owners can see the wisdom of pinning the old building with new cement foundations. The prevailing system for this work is to jack up the old building temporarily above the ground, thus making a space to tuck the new cement floor under the sills. If a layer of about 8 inches of cinders or gravel is laid first, surmounted by a cement floor 41/2 inches thick, it will be found unnecessary to build any masonry foundations. The building, after the floor is laid, can be let down upon the floor (made just the right size to accommodate it) and your structure will be permanently constructed. Frost will not heave the building noticeably because of the cinders underneath, though probably a slight deviation takes place which might, possibly, crack plaster. As a rule, however, old barns are not plastered so there is nothing to fear in this regard.

In laying floors for old or new garages when the floor itself is to act as the foundation of the building, the cement floor should not be jointed, but should be built in one piece. When jointed, the weight of the building is apt to cause cracks in the joints.

Figure 1 is an example of new cement steps recently built to take the place of wooden steps with brick buttresses. The original buttresses of brick were in good shape, but the wooden steps, of course, had rotted away. In replacing the



Fig. 5. One wide step and three narrow steps make an inviting approach. Show these illustrations to your customers, contractors, and try to get some of this work

wooden steps with cement the owner decided to make the buttresses of cement as well. He is delighted with the job and knows he will have no further repairs to make so far as steps are concerned.

Another example of a type of cement steps and buttresses now popular with owners and architects is illustrated in Figure 2. In this case one flight of steps extends to the top of the earth bank around the house, at which point there is a cement slab forming a little terrace. Then the cement steps and platform of the house proper begin.

Almost any blacksmith can knock out a Colonial iron railing like that shown. For a more pretentious cement entrance to a big house note Figure 3

showing a substantial home of brick with a wide cement approach, cement steps and buttresses. The steps lead from the sidewalk level to the top of terrace, from which point steps lead to the level of the

house proper.

Many architects work out the design of steps and buttresses to provide space for flowers and shrubs, as is indicated in Figure 4, where the buttresses at the sides of the steps are made hollow to hold earth for flowers. Flower boxes of this sort are very inexpensive and contractors can build up a side line of similar work for old houses. Cement flower boxes are much more substantial than wood and are very attractive in appearance. They appeal to owners who desire to beautify their places with flowers, using some material for flower boxes more enduring than wood. Note also in Figure 4 that the center of the terrace above the steps contains a flower pot with a cement curb.

Cement work can be contracted for by carpenter contractors as well as mason contractors; in fact, a considerable amount of carpenter work is required



Fig. 6. Cement steps with stone buttresses added to an old house. Builders can confidently recommend this work as enduring and attractive



Fig. 7. Inside the grounds are many places for cement and brick sidewalks and steps. The contractor should be equipped to do this work

in the building of steps, buttresses and flower boxes because of the forms required. Of course, carpenters can not mix the cement and pour it, but the carpenter contractor can just as well employ a cement-finishing gang as a mason contractor, and add to his income the profit accruing from cement work.

Many homes are built on a higher level than the sidewalk, having a terrace of earth about their foundations, and it is in situations like these where the builder finds his greatest demand for cement steps. There is hardly an owner, possessing an old place where wooden steps have been used to surmount a terrace, that can not be talked into building with more permanent materials and replacing the wooden steps with cement steps and buttresses (Figure 5).

In remodeling old houses an opportunity is given to promote the use of masonry steps, and a good example of a plain set of such steps used to replace former wooden steps is shown in Figure 6.

In building sidewalks for houses there are many new ideas to follow that have been tried out and can confidently be recommended to contractors as applicable to their work.

In the first place, there are the regulation cement public walks, 4 feet wide, consisting usually of 8 inches of cinders, 4 inches of concrete and ½ inch of cement finish. These are usually jointed every 5 feet (public walks) but interior walks, which are frequently narrower than public walks, are often jointed every 3 or 4 feet.

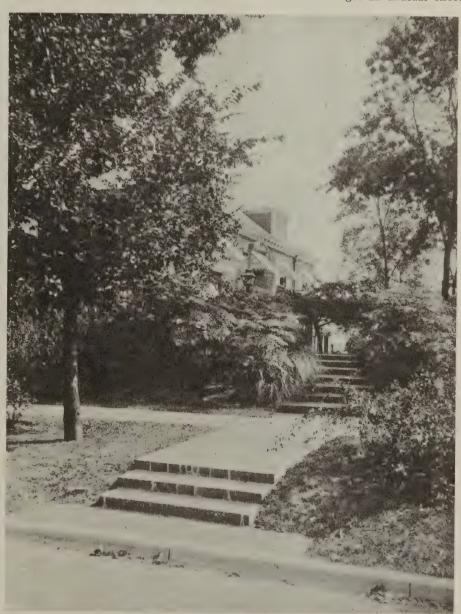
For the past few years brick walks have become very popular, but to build a permanent brick walk it has been found necessary to use concrete for the base. Figure 7 shows such a walk in which a base of concrete 4 inches thick was laid on a bed of cinders 8 inches thick. On top of this base a bed of sand about 2 inches thick was spread for the brickwork, consisting of brick on edge, tamped into the sand and slightly crowned in the center. Along the edge is a cement curb 6 inches wide to hold the brickwork in place. After the brick were laid they were grouted with thin cement poured into the joints.

In grouting brickwork in this manner builders will find they can save considerable labor if they have the brickwork washed off *before* the cement grouting has set. Otherwise, the daubs of cement on the face of the brickwork is hard to remove. If wiped off immediately after grouting the brickwork is easily cleaned.

Some brick walks are not grouted and after tamping the joints are merely filled with fine sand swept into the joints, but this does not produce as smooth a walk as with grouting (Figure 8).

A pretty combination of boulders and cement often works out well and has proved popular with owners. Contractors can frequently promote work of this character and build up a side line of garden work by specializing in garden cement work. Figure 9 shows garden steps used in conjunction with boulders and Figure 10 illustrates a cement pool built in a garden, which proved profitable work for the contractor, who has built up a side line of garden work, bringing him in a desirable addition to his income every year.

Some architects get an unusual effect



every 5 feet (public walks) but interior Fig. 8. Builders specializing on cement walks topped with brick can build up a good side line



Fig. 9. In the garden is an opportunity for contractors. They should be known as experts in garden walks, steps and cement garden furniture

in their brick walks by omitting the visi- building first-class walks and steps will ble cement edge to the brickwork, the find his services in increasing demand, latter being effectively held in place by whereas the contractor who does a



Fig. 10. Cement pools are in great demand. Do you know how to build them, Mr. Contractor?

means of a small cement shoulder extending but 2 or 3 inches above ground. The grass soon grows up to cover this shoulder so it is invisible (Figures 12 and 13).

Brick-covered cement steps are increasing in popularity and builders are justified in pushing them with customers who want something a little less usual.

In building either cement or bricktopped steps contractors should be extremely careful that the concrete foundations extend down well below frost (usually at least 4 feet, 6 inches). The builder who has the reputation of

cheaper job, which may go to pieces in time, loses out every time.

There have been so many examples of poorly-built cement steps and walks that some house owners have begun to think that it is impossible to get permanent results in this character of work Every contractor knows that step and walk work put in right will last as long as the house, and they should endeavor to do their work in such a way that every job will be an advertisement by means of which to secure future jobs.

It is always good business to cast the firm name on any cement work.

Concrete Painting

Nearly all painters experience difficulties when painting, and if concrete enters in any way into the problem, this is especially true.

Water-proof concrete paint may be divided into two classes, one which gives a light tint, and one which is nearly black, because it contains tar and asphalt

We read of one painter who used the term, "Salt Process," when mixing paint One hundred pounds of white lead ground in oil, were broken in one gallon of linseed oil, to a stiff paste; ten pounds of salt was dissolved in three gallons of boiling water, and stirred slowly into the lead and oil, stirring for about twenty minutes. The salt and water broke up the lead, as well as the linseed oil, to the consistency required for painting The first coat dried flat and the second stood out with a good glass. It was stated that this formula was tried or cement, brick, and plastered walls, all of which gave equally good results.

One man tried priming a cement wall with graphite paint, following it with four coats of white lead and linseed oil paint. The finely divided pigments will seal the small pores in the surface of the concrete, leaving less work to be done by the vehicle. Any color may be had. Concrete should be exposed to weather before linseed oil paints are applied.



Fig. 11. Are you getting your share of the cement and brick steps now so popular with owners? Are you doing what you can to promote this work as a side line?



Fig. 12. New type of brick steps supported on cement concrete foundations; the cement work is invisible

Renewing Floors-By John Upton

THERE are many buildings and rooms, as school houses and kitchens, where the carpenter will be asked to replace a badly worn floor with a new one. While this work may be considered as not naving any special difficulties, a few hints may be of help to those not familiar with such jobs.

In some cases, as where the joists or floor timbers are badly settled, it will be well, though not absolutely necessary, to take up the old floor so as to make the work beneath it right, but in cases where the floor runs under the wainscoting, it is best to leave the old floor in place, and in some cases, this should be done for the sake of the extra warmth afforded by it, and the sheathing paper which may be put over it. Sometimes one can use

shingles and lath as strips for furring to bring the new floor up level.

The second floor should always be laid across the old one rather than in the same direction. If the old floor is rough, with knots sticking up, these should be cut off with an adze.

There are some floors which have had hard usage, as in school houses, where the present floor is laid across the original one, and in such cases it should be taken up and a new floor laid in its place. There are several good reasons for this. It will generally bring the boards running in the right direction. The lower floor will have had the knots trimmed off, and taking up the present floor will save cutting off the bottoms of the doors.

When taking up an old floor, take up first the board put down last, because the nails come out better this way. If there are seats, desks and so on to be moved, clear up one side of the room and begin laying the new floor on that side, if it seems best. The first thing to do is to scribe a board to fit the side-wall. Unless a moulding is to be used to cover the joint, this board should be made to fit snugly its entire length, and should be cut to fit the wall, not bent or sprung to place, for this would make the rest of the boards come crooked.

Sometimes the walls against which the ends of the boards come will be crooked and then the boards should be cut to fit, instead of being square.

In doorways or other openings it may be desirable to let the boards run through from one room to the other, but if not, a good joint can be made across the doorway, and this will allow for each room being floored separately.

In finishing up at the side it may be necessary to scribe the last board and rip it to fit, and in order to get this last one in place you may have to rip the tongue off from the one next to it; or you may find a case where the side-wall is crooked and the last board will not quite fill in some places, while in others it is too wide, and in such a case I find it well to rip out a narrow strip an inch wide and place this down next to the wall and then fit the last board against this.

This narrow strip may be scribed to



Fig. 13. Brick walks are very popular for brick houses. Why not specialize in this work?

NATIONAL BUILDER

fit the wall so that the other board will be the same width all its length.

The tools generally needed for this work will be a rip saw, wrecking bar, adze, line, plane, block plane, try square and hammer.

After laying five or six boards take a piece of 2x4, some four feet long, and place against the last one, then use an adze or axe to drive them tight together. Do this every few boards and the work will be tight.

Saw all joints square; that is, straight up and down, and see that there is a bearing or support under all joints. Nail the seven-eighths flooring with 8d nails every eighteen or twenty inches.

Houseboats Help Solve the Rent Problem By Delphia Phillips

TWENTY houseboats in a row with a sort of swinging walk connecting each one with the street in front of it is rather an unusual sight. Fronting the railroad tracks, which are somewhat ele-

seems to be room for everything. The largest one in the row is 19x34 in dimensions, and there is room for a piano, sewing machine, large rocking chairs, and the like. One little woman did her sew-

there are more flowers in bloom, and in one case, even a vegetable garden is achieved. Few people would dream of raising watermelons in such circumscribed environments, yet this is what



Section of "Houseboat City," San Pedro, California

vated, this "Houseboat City" is situated on what is known as the West Basin of the bay at San Pedro, Cal. These houses are neat and comfortable, and some even luxurious. As there is no lot to buy and no taxes, the working people and others who live there, find they are able to rent a house in this row, or buy one, considerably cheaper than elsewhere.

When the war brought such unprecedented incentives to shipbuilding, the problem of housing the thousands of men who came to work in the San Pedro ship plants was an acute one. There were practically no houses to be had, and rents were therefore extremely high, so that this little Houseboat City had no inconsiderable share in solving this problem. The tenants, in some instances, bought the houses outright, and every occupant in the row is delighted with his cozy, little home.

A sum of fifty cents a year is charged for permission to hold the particular site that a houseboat occupies, and there is running water in the houses, for which the tenants pay. There is nearly enough driftwood floating about to keep the tenants warm, and the cooking is done with oil. The space is well conserved in the tiny houses, so that there

ing on a machine operated by hand power. This machine could be tucked away in her trunk when not needed.

Almost every house has its boxes of blooming plants in rows along the veranda fronts, and from the rear of the city there is a really charming view out over the little bay to the hills beyond. Along the walks that lead to the street

one woman actually does in her boxes of soil ranged along her walks. To keep the tiny melons from falling overboard the ingenious woman has arranged a sort of sling made of cloth in which they are placed and allowed to grow. They do not attain a very great size, but this optimistic gardener assured the writer that the taste of them was unexcelled.



Domenico Moretti, the old gondolier, who builds houseboats, and his dog in front of his own houseboat



The little dwellings are very neat and trim in appearance

The presiding genius of the place, the man who built many of the houses with his own hands, casts a glow of picturesque interest over it, for he is none other than a famous gondolier, one of the first to come to this country, Domenico Moretti, who has gondoliered at every world's fair where a lagoon could be found or a concession secured, and

at many others besides. He has been in this country for fifty years, and just now is busily engaged in building pretty little houseboats, not only of lumber, but fashioning them out of old launches and other unique material.

All the houses are built on barges and these are securely fastened to pilings so the inhabitants may feel secure of not floating off in a storm or of rocking about in a wind. If it is desired to move the houseboats elsewhere they are jacked up, pried loose and floated off at high tide. Mr. Moretti can take the hull of an old launch and build a neat little apartment on it, or cut out some more windows in a boat no longer seaworthy, fit up the interior for housekeeping, set it up on stilts, and solve somebody's housing problem.

WANTED: PLANS FOR SAND AND GRAVEL STORAGE BINS

W. G. G. is thinking of erecting bins for the storage of sand and gravel. The plot of ground on which the bins are to be erected is on a level with the tracks of the railroad switch. W. G. G. wishes to build his bins in such a way that they shall be on a level with the sand and gravel cars, and so built that a truck or cart can be backed up to the bins to receive the material.

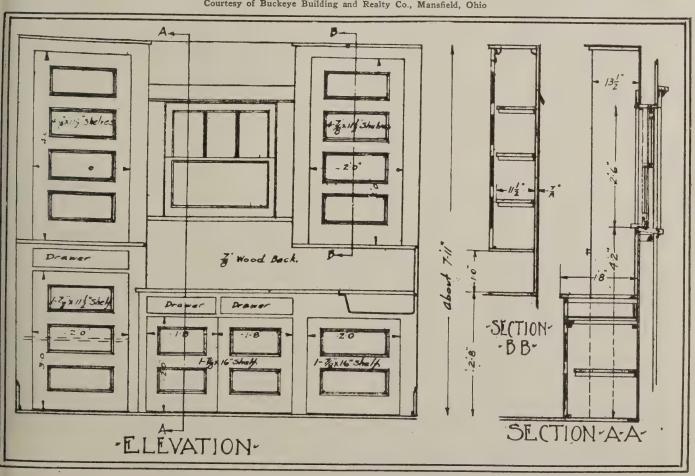
ACCURATE DESCRIPTION

"What is an Italian vendetta."

"It is one of them new-fangled porches around the new style cottages."-Baltimore American.

Details of Kitchen

Courtesy of Buckeye Building and Realty Co., Mansfield, Ohio



Some Notes on Painting - By A. A. Kelly

The Contractor and Builder is Often as Much Interested in Paint and Painting as the Painter. On Occasions He Either Does the Painting or Engages the Painters. He Should Know All About Paint and Its Application

THE sunny side of the building requires a paint containing more oil than that used for the north side, on account of the sun, which is stronger on the south side than on any other part. It is not the "weather" that is so hard on paint, it is the sun. You see that on the shingle roof—the south half, after some years, will show badly, while the north side will be in fair condition.

Less paint and more painting is a good rule. Three thin coats will wear better and look better than two heavy coats.

Is Raw or Boiled Oil Best?—For some purposes the boiled does best, when you can get the pure article. But raw oil as a rule is best for exterior painting, because it is more porous than the boiled, which is more like a varnish. The raw dries out from the bottom, because the air, or oxygen, passes through it and does not do so with the boiled oil. The latter dries from the top down, first forming a skin, which excludes the air.

Fresh Paint—Paint will spread and wear better when mixed a day or two before application, this applying only to that used on the outside, or where oil alone is the thinning agent. This allows the paint to "ripen," or get a more perfect union of its ingredients. But if allowed to stand too long it becomes "fatty," or partially oxidized, and in this condition it is not a safe paint for exposure to the sun, as it is apt to blister. Never use fatty paint.

The Use of Driers—Use judgment in adding driers to your paint. There can be no set rule as regards quantity to use, only that with regard to circumstances. If a dry, warm day, then very little should be used. Wet or cold weather more should be used. Driers injure paint when used to excess, and in any case they do so to some extent. For a tin roof, warm weather, no driers at all, as raw oil will dry without it, and give a more elastic job, one likely to withstand sun and rain.

To Repair a Cracked Wall or Ceiling

Plaster of paris and glue size makes a good cement, but it is apt to shrink a little. After it is dry give it a coat of shellac. First, sandpaper it smooth. For small cracks a putty made from white lead and whiting, with a little varnish in it, and some driers, does well. A large crack should be cut out and keyed, the inner part wider than the

outer, so that it will hold the plaster filling. It is best to not quite fill it at first, and when partly dry fill out. When dry, sandpaper and shellac. For an old wall, when the crack has one side higher than the other, use the French method, mix white lead and japan to a stiff paste and apply with a broad glazing knife or small trowel, and level it so that there will be no appreciable difference in it, making a nearly even surface. Sandpaper it smooth.

To Mix a Pot of Paint

If for inside use, and for the coat next to the last, mix eight pounds white lead with three pounds zinc white with about two tablespoonsful of white japan drier. Mix together thoroughly and strain through cheesecloth. This will give about ten pounds of good bodied white paint. Thin with thirteen ounces, or nearly one pint, of turpentine.

Priming Coat of Paint

The first coat on outside work should be thin, and the best is made from white lead thinned with raw linseed oil, with a little driers, not much, as that would dry the paint too soon and interfere with its entering the wood. But in cold or damp weather more driers will be necessary. Don't use zinc white for priming, as it is a poor drier, and will not cover as well as lead. Also, never use yellow ochre, as it is sure to throw off the coats of paint laid upon it.

Staining Shingles

The most permanent stain for shingles is that prepared from creosote, which is a wood preservative. The natural color of this stain is not desirable, hence we color it with certain pigments, those mostly used being the siennas, umber and the oxides. Red and green are often used, and these pigments must be of the best grade. The best way is to buy the ready prepared stain, selecting the color desired. Shingles should be perfectly dry before staining, and the best way to do this is to open out the bundles and let them have all possible time for drying.

Many architects specify the creosote stains, but as a rule they advise dipping them, about two-thirds their length. And this is the best way, for it stains the parts that will have to stand exposure and wet, besides which the faces and edges all have a uniform coating

and coloring. But it takes more stain than by the brushing method, or applying the stain with a brush after they have been laid. Don't thin out the stain, at least not with coal oil. The stain should dry as well on metal as on wood, and if it does not there is something wrong, coal oil likely. The way to do the dipping is to open the barrel containing the stain, taking out the barrel head, and having a cross piece on the barrel, near the edge nearest you, and after dipping the shingle draw it over this piece to remove the surplus stain. Do both sides this way. Throw the shingles, after dipping them, on to a pile where the air can get at them; they will soon dry and be fit for laying next day.

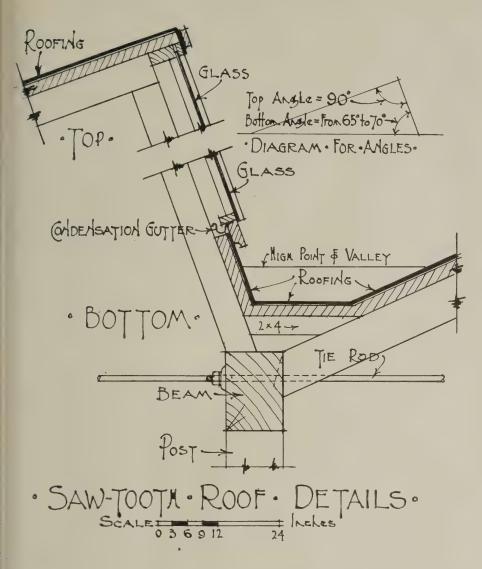
Painting shingle roofs does not do so well. A writer in NATIONAL BUILDER some years ago told of his experience in painting shingles; he had had some repair jobs on cedar shingle roofs that had been painted. He found at the end of each shingle the paint line a little higher than the shingle underneath, which dammed up the rain water and caused rotting. In the first place, a cedar shingle roof does not require paint or stain, unless it is desired to color for decorative effect. I have seen cedar shingles a century old and still in good condition. I have come across some that were over one inch thick at the butt. Some shingle. Such shingles look better without paint or stain, as the natural weathering is the best coloring.

For a large operation, where the price is not sufficient to justify pure creosote oil stains, you can make up a stain with three gallons of water, white 150 degrees test petroleum oil, three gallons of creosote oil, and one gallon of liquid drier. Crude oil, kerosene or coal oil, with some other mineral oils, will not unite with creosote oil.

Creosote stain will thicken some in cold weather, owing to the naphthaline content, but this may be rectified by keeping it where the temperature is not lower than about 40 degrees Fahr., heating it slightly when muddied by the cold. Summer is, of course, the best time for applying these stains.

If you do have to paint shingles, dip them in the paint, and that will keep the wood from absorbing moisture and rotting. Painting the shingles after they are laid is very bad for the roof; far better let them go without any treatment.

Saw-Tooth Skylight



L. G. Q. asks for recommendations for the pitch of saw-tooth skylights.

As shown by the accompanying sketches, the top angle should be about 90 degrees and the bottom angle between 65 and 70 degrees.

All angles should be carefully made to prevent leaks, and there should be no enclosed hollow spaces that would be difficult to reach with a hose in case of fire.

There are various ways of framing saw-tooth roofs, but the method shown is simple and economical. The valley should slope about one-half inch per foot. This slope is obtained by cutting in two-by-fours of various lengths between the rafters.

The condensation gutter is necessary to prevent water from dripping to the floor below. The conductor from this gutter should be carried down inside, as it is likely to clog with snow and ice if it is run through and allowed to spill on the roof.

OVERCOATING FRAME HOUSES SAVES COAL

In these days when every one is looking for means of fighting old man H. C. L. anything which will help to reduce the size of household expenses is of tremendous importance.

Metal lath manufacturers have claimed that the use of stucco and metal lath for overcoating old frame houses would very materially reduce the amount of coal required to heat the house during the severe winter months.

Tests have been recently conducted at the Armour Institute, Chicago, by the Associated Metal Lath Manufacturers, which prove conclusively that overcoating is a heat saver to frame structures.

These tests show that the influence of heat and cold on the ordinary frame wall is reduced 15.7 per cent when overcoated with portland cement, stucco and metal lath. This means that this construction is an added insulation so that 15.7 per cent less heat passes out of the

building through the walls and consequently the house is warmer in winter and cooler in summer. Considering that the windows occupy 15 per cent of the total wall space, the net saving in the coal bill for the owner of a frame house which has been overcoated is 13.3 per cent.

At the present price of coal it is cheaper to overcoat a house than to leave it with an exterior surface through which more than 15 per cent of the heat is lost and which must be frequently painted in order to keep it attractive and in good repair.

Overcoating not only insures a saving in fuel and the cost of upkeep of the building, but an old house can by this method be easily modernized and very materially increased in sales value.

ANNOUNCEMENTS AND LITER-ATURE RECEIVED

PROGRESSIVE STEPS IN ARCHITECTURAL DRAWING, by George W. Seaman, Architect; 63 pages, 7½ by 10 inches. Published 1919 by The Manual Arts Press, Peoria, Ill.; \$1.25 ng.

This well illustrated and thoroughly practical and up-to-date text book omits all of the lengthy descriptions of instruments, methods of drawing circles, and other tedious matter which usually encumber text books on drawing. From the very first the student is set to solv-

ing practical, every-day problems.

Each of the 32 full-page plates contains from one to twenty drawings. The arrangement of the drawings is progressive, that is, one drawing shows the first lines that are laid out, the next drawing shows an additional set, and so on until the completed drawing is reached. The student is thus led into the subject by degrees, and instead of merely copying the completed plate he is shown the meaning of every line that he draws.

The majority of the drawings Illustrate the design and construction of building details, and two plates are devoted to architectural lettering. These details alone should give the book wide popularity as a reference work among architects, builders and draftsmen. The book is also of value to mechanics and others who desire to obtain a knowledge of plan reading.

Markets for Cement Products—a Business Opportunity for You—This pamphlet of 24 pages is issued by the Portland Cement Association, 111 West Washington Street, Chicago, and is copiously illustrated with reproductions of cement work in the various forms in which cement is used—from ornamental vases and statuary to drain tile, fence posts, hog pens and monumental buildings.

Doorways, the house organ of the Richards-Wilcox Company, Aurora, Ill., is always interesting, featuring the modern contrivances that add to the con-

venience and space saving in building that are so much in demand.

Zinc Metal Sheathing-An Old Product for a New Purpose-The Church Appliance Manufacturing Co., of La Salle, Ill., issues a descriptive leaflet, under the above title, showing the advantages of thin zinc sheeting as a substitute for building paper.

Healthful Heat is the title and the theme of a series of booklets illustrative and descriptive of the Homer original pipeless furnace, issued by the Homer Furnace Manufacturing Co., Homer, Mich. The illustrations, diagrams and text presenting the various features of this system of heating make a convincing piece of literature.

The Carter Times—"Published every once in awhile in the interest of good painting," by the Carter White Lead Co., West Pullman Station, Chicago, is a house organ in which practical and valuable suggestions on paint and painting are contributed by painters.

Truscon Structural Pressed Steel for Floors, Roofs, Walls and Partitions, issued by the Truscon Steel Co., of Youngstown, Ohio, gives illustrations, diagrams and details of the construction work indicated by the title, together with tables of safe loads, etc., making a valuable and informative work of reference.

Truscon Steel Windows is a book of 100 pages, with full index, issued by the Truscon Steel Co., Youngstown, Ohio. Illustrations, details, plans and diagrams make the book as comprehensive as it is valuable.

Milliken Buildings-The Milliken Brothers Manufacturing Co., Inc., Woolworth Building, New York, has published a new catalog (No. 10) descriptive of Milliken Buildings. Structures of this type are built under the Standardized Truss Unit System, designed by the company. It makes use of a small, interchangeable, standardized structural steel unit, and the buildings are allsteel, permanent and fireproof; they are furnished complete with sash, doors, skylights, etc. These buildings are suitable for all classes of industrial and manufacturing structures, plantation buildings, warehouses, etc. The system makes possible low transportation and erection costs, allowing the choice of a thousand buildings, all constructed under the same unit type. The catalog is 81/2 by 11 inches, and profusely illustrated with buildings of this character erected for the United States Government and other important interests. Space is also given to the transmission towers, radio towers and special poles built by the company. A companion book of like size, known as Catalog No. 11, has been

issued as an Erection Handbook; this forms a complete guide to the construction of any Milliken Building from foundation to roof.

The "Evolution of the Window," issued by the Monarch Metal Weather Strip Co., St. Louis, Mo., illustrates and describes the application of weather strips to casements, doors and windows.

Portable Conveyors of various types for various purposes are illustrated in a folder issued by the Portable Machinery Co., Inc., Passaic, N. J.

Standardized Material-Handling Machines, portable belt conveyors and selffeeding bucket loaders are illustrated and described in a 32-page brochure issued by the Barber-Greene Co., Aurora, Ill.

Protective Paints for all varieties of purposes are described in a series of booklets issued by the Natroco Paint & Varnish Works, owned and operated by the National Roofing Co., Tonawanda, N. Y.

The Lansing Vitrified Tile Silo System is illustrated and described in a 22-page booklet issued by the J. M. Preston Co., Lansing, Mich.

The publications listed herein can be obtained on request. Keep a live file of catalogues and trade literature, Mr. Builder. It will pay you to keep posted

Frank Mixers, which mix mortar and plaster as well as concrete, are exploited in an eight-page booklet issued by the Frank Manufacturing Co., Century Building, Des Moines, Iowa.

Hoosier Water Supply Systems is a 32-page, illustrated folder describing the varied equipments of water systems manufactured by the Flint & Walling Manufacturing Co., Kendallville, Ind., from the small, hand-power pump, windmill, to electric and gas-engine pumps and equipments.

The Machine Guard Handbook is the title of a 44-page booklet containing useful information pertaining to guards and mesh partitions, issued by the Penn Metal Company, 65 Franklin Street, Boston, Mass. Department folio No. 125, Engineering Dept.

Penco Smooth Bottom Culverts are illustrated and described with diagrams, tables and details of culvert laying in a

20-page brochure issued by the Metal Company.

Rudy Furnaces are exploited in a hand some catalog issued by the Rudy Furnace Company, Dowagiac, Mich.

The Art of Wood Carving is the title of a carefully designed brochure issued by the ecclesiastical department of the American Seating Company, 14 East Jackson Boulevard, Chicago, and contains fine illustrations of interior church dec-

Schoedinger's Universal Lock-Joint Metal Ceilings and Side Walls, Catalog C, issued by F. O. Schoedinger, Columbus, Ohio, is a large, handsomely illustrated work of 110 pages, with full instructions regarding the application of these specialties. An accompanying folder, "Capitalizing the Air," describes and illustrates installations of Schoedinger's rotary suction ventilator.

Superior Single Bowl Sanitary Chemical Closets, folding arm chairs, and electric "sanitary" churns, are described in a group of leaflets issued by the Superior Churn & Manufacturing Co., Northville, Mich.

STATEMENT OF THE OWNERSHIP, MAN-AGEMENT, CIRCULATION, ETC., RE-QUIRED BY THE ACT OF CON-GRESS OF AUGUST 24, 1912,

AGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

Of National Builder, published monthly at 542 S. Dearborn St., Chicago, Illinois, for October 1, 1919.

State of Illinois, County of Cook.

Before me, a Notary Public, in and for the State and county aforesaid, personally appeared George P. Miller, who, having been duly sworn according to law, deposes and says that he is the business manager of the National Builder and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to-wit:

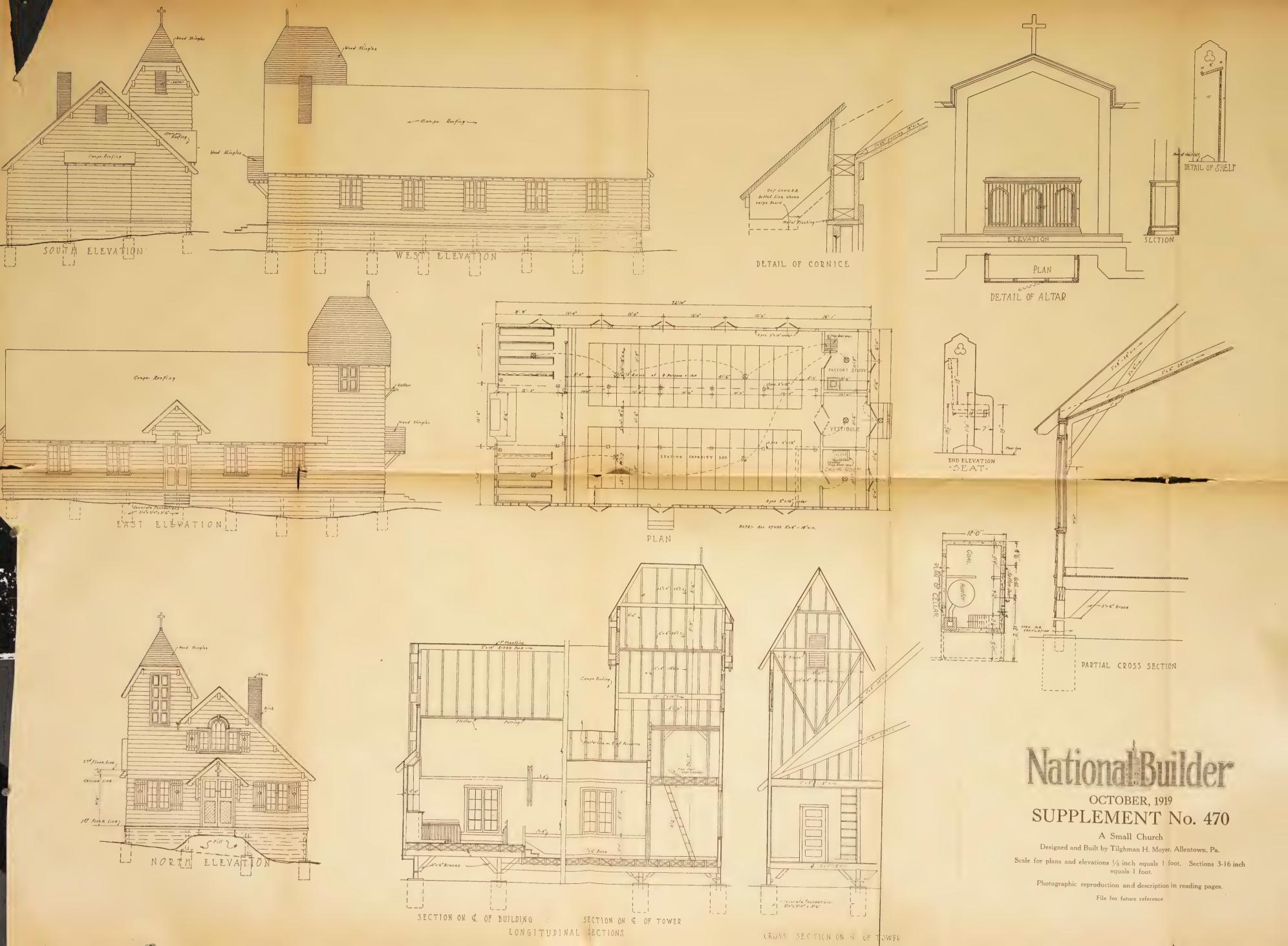
1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Tradepress Publishing Corp.; Editor, A. H. McQuilkin; Business Managers, W. D. Callender and George P. Miller, all at 542 S. Dearborn St., Chicago, Ill.

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	Eaglesfield-Stewart Co., The101	Sheldon Mig. Co
	Edwards Mfg. Co103	Sheridan Public Schools 109
]	Flintkote Co102	Sidney Machine Teel Works110
	rox Supply Co 100	Sidney Machine Tool Co
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	eger Machine Co111	Vendor Slate Co 86
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	,	White Co., Inc., David
Ka	nawha Mfg. Co 95	Vood-Mosaic Co



's beautiful residence, Baltimore, Md. Mr. Otto G. Simonson was the Architect, and Mr. Daniel Shaffer the Stucco Contractor. Bishopric Board used on all exteriors.

ar Client's Dream Home

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Used on interior walls, ceilings and partitions it provides desirable insulation, smothers sound and saves time,

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AVE you ever tried BISHOPRIC SHEATHING? Its final cost, applied, is nearly 30% less than for 1/8-inch wood thing and it makes a solid wall without knot-holes. More and more Corporations are using it for industrial housing.

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Your request will bring our booklet giving the perfect Stucco mixture and reports covering tests made of Bishopric Board by Sheffield Scientific School and others. Also sample of the Board. Write.

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Cincinnati, Ohi

NATIONAL BUILDER

Volume 62

Chicago, November, 1919

Number 11

Service to the Public

THE Industrial Conference representing capital, labor, and the public, splitting on the proposition that labor has a right to organize, to negotiate wages, hours and conditions, as organizations, through representatives of its own choosing, has dissolved itself without reaching any conclusions. Its services have made the character of the obstacles to agreement only more clearly defined.

Following upon this has come the

Radicalism within the ranks of organized labor has set the authority of the national officers at defiance, and even in local organizations employers find the representatives of the workmen helpless in controlling the illegal acts of men they represent.

The dislocations caused by the war, the sacrifices of men, material and money to get activity and means to win the war have been grafted upon until men's ideas are out of proportion to their responsiweek and wages of from \$6 to \$12 per day.

An enormous shortage of houses is therefore faced by shortage of material of all kinds. In every case, with few exceptions, a good explanation is given—one case hangs upon another. It is evident that the lines will be more and more clearly drawn between producers—whether represented by capital or labor, and the public will inevitably demand a show-down from both.



-Courtesy Chicago Tribune

threatened strike of the coal miners and the Brotherhood of Locomotive Firemen and Engineers.

The government is preparing to put n force legislation making the progress of the work of the country compulsory with particular reference to the essential ndustries. The proposition that the country owes a man a living has also the side that a man owes his country service, and he must not lie down in a crisis while his wrongs are being investigated and righted.

bilities in the work of restoring conditions to a normal basis.

Nature, as typified in the cartoon, is giving us bountiful returns. The country is immensely wealthy. The question now is a more adequate and a just division of that wealth.

A leading investment banker of Chicago states that America has 20,000 new millionaires as a result of prosperity superinduced by the war.

Wage lists in the building industries show in a number of cases a five-day

NATIONAL BUILDER COVER DESIGN

The cover design this month illustrates the ingenuity exercised by a job superintendent in the employment of the Aberthaw Construction Company, of Boston, Mass., in using trunks of nearby trees that were to be cut down later, thus saving the time in erecting masts for the derricks to hoist materials to the upper stories of a cotton mill in course of erection for the Nashua Manufacturing Company, at Nashua, N. H.



A Cottage Bungalow

Supplement No. 472

NE of the most popular types of of houses in America is the cottageungalow. True enough, the bungalow tyle has suffered somewhat from its soalled friends, and for a while it appeared hat the activities of the "jerry" builder vere destined to place anything which ame under the head of "bungalow" in he undesirable class. Then, too, there 7as the "bungalow bug" who "lifted". odily the type of bungalow designed for ne climate of semi-tropical California nd set it down on the bleak prairies of ne Central West or in the snows of the ong winter of the northern or eastern tates. These abuses finally had the efect of discrediting the style to such an xtent that many people considered that o one in his right mind would build or uy a house of the bungalow type.

By means of the numerous articles on ne design and construction of homes hich are constantly appearing in the ewspapers and in almost all of the magnines, the average man is gaining a conderable amount of practical knowledge bout building. In many cases he is apable of recognizing the earmarks of noddy materials or cheap workmanship, and his taste is being improved to the ctent that he is not likely to favor any tempt to give him a design that is not not uited to the climate or locality.

This education of the general public is resulted in making it increasingly flicult for the "jerry" builder to find a arket for his claptrap houses, and is so eradicating the "bungalow bug." hese two handicaps being lessened, the saibilities of the bungalow type is ain being generally recognized as ofting something worth while in the way design.

The true bungalow is of course, a oneory affair; the cottage-bungalow is uslly a story and a half, or in rare cases full two-story house. The cottagengalow derives its name from the fact at it combines the cottage type of inrior arrangement with the exterior aparance of the bungalow. For a given nount of floor space the cottage-bunlow is more economical to build than the true bungalow. It requires less indation work, less roof surface, is sier to heat, and usually permits a betarrangement of rooms in so far as ht and ventilation are concerned. The ngalow seems naturally suited to mild mates, but the cottage-bungalow is re practicable and satisfactory for der localities. Much of the charm of lifornia bungalows is due to the

wealth of flowers and vines which surround them throughout the year, and any attempt to copy one in a colder climate where the vegetation is replaced by snow and ice throughout the winter, usually proves unsatisfactory. In capable hands, however, the cottage-bungalow type may be designed so that it will be entirely satisfactory, both in its practical features and in its appearance.

The cottage-bungalow, which forms this month's supplement to NATIONAL BUILDER is an excellent example of its type. It was designed by Howard J. Wiegner, architect for Mr. F. E. Heller, of Bethlehem, Pennsylvania, and offers

As noted in the illustration of this Cottage Bungalow on the opposite page, full working drawings are given in the Supplement to this issue. These are exact replicas of the architect's drawings. By pasting them on stronger paper or on muslin cloth they can be preserved for years. The careful filing of these monthly issues gives the builder a suggestive reference file of increasing value and varied character.

several unusual features that should prove of value to anyone who is interested in up-to-date houses of this character

The exterior follows the lines of the bungalow type. The walls are of wide clapboards and the gables are shingled. The detailing is very simple; the slight splay at the tops of the porch columns; the beam brackets under the verge board; the shutters and the flower boxes, are depended on to take care of this phase of the design. Simplification of details is a good index as to a designer's ability. and success.

The basement has concrete walls and a cement floor. The cement floor is omitted in the provision room, as an earth floor is considered more satisfactory for keeping certain vegetables. The provision room is separated from the remainder of the basement by a sheathed stud partition and it fitted with wide shelves for storing preserves, etc. A slight sav-

ing could have been effected by placing the fuel rooms inside of the main basement and allowing the entire area under the front porch to remain unexcavated.

The first floor is a model for compactness. The front porch extends entirely across the house and on hot days is protected from the sun by an awning. The porch floor could have been made of a reinforced concrete slab at a small additional first cost and would have required no future expense for repairs and painting. The entrance is directly into the living room, at the other end of which the stair leads to the second story. The coat closet at the stair landing is a practical convenience. The living room contains a large brick fireplace and opens into the dining room through a cased opening. French doors in this opening would be an improvement. kitchen contains a built-in cupboard and a small storage pantry is formed in the passageway which leads to the basement stairs. A door to the living room through this passage would do away with many of the steps necessary to reach the main stair from the kitchen. The vestibule forms a windbreak between the kitchen and the outside and provides a space for the refrigerator. The laundry also opens off the vestibule and is provided with two tubs. Laundries on the first floor instead of in the basement are growing in favor; this is probably due to the increased use of washing machines, which have reduced the labor and space required for this task. The large rear porch would prove a delight to most housekeepers, and the trap door to the basement at one end gives a convenient outside entrance to the cellar.

The second floor contains three bedrooms, all of which have cross-ventilation and ample closets, and the main bed rooms have full-length mirror doors. The linen closet has double doors so that it may be thrown wide open, thus making its contents more quickly available. The bathroom is almost too large and a little rearrangement here might provide a sewing room. The bath is economically located with respect to economical plumbing, as it is directly above the kitchen.

The house is equipped with modern plumbing and is heated by a furnace in the basement. The trim and floors of the kitchen, entry and laundry are of yellow pine. The trim of the remainder of the rooms is of basswood with oak floors. The stair has birch newels and handrail.

How Should an Estimate of Cost be Made

By Daniel J. Hauer, C. E.

HAVE FIGURED on more than 20 jobs this season," says a builder, "but have only gotten one or two contracts. Figures are all too high."

Unless the proper estimates are made when bidding, jobs can not be secured. There is always the chance that some builder has bid too low, due to inexperience in certain lines of work, or has made an error in his estimate, but in most cases a low bid does not mean a money loss to the successful bidder, but rather that he has estimated closer than the others, either by having a better knowledge of the work that is to be done, or a better method and system of estimating.

Successful Bidding

Successful bidding, as well as the successful carrying out of building contracts, must be based upon the knowledge and ability shown in estimating. There are many ways of making up estimates, and the fact that half a dozen builders may bid upon a building and their prices all be within 1 or 2 per cent of one another shows that varying methods of estimating bring surprisingly close results. On the other hand, it is evident that when one or two bidders are 10 or 15 per cent lower than a large group of bidders, and one of these low bidders receives the contract and makes money on the job, that this bidder's method of estimating must vary from the others, and be done along better

Result of a Discussion

This subject recently came up for an informal discussion among some builders and architects in one of our large eastern cities, and the information on bidding as brought out may be a help to others.

Lists of Items

All agreed that the first thing necessary was to list the various items of cost, as plans, survey, bond, insurance, workmen's compensation, permits and other general items of expense. Then the list of work, whether done by the contractor or subcontractors, must be gotten up; such as excavation, concrete, brickwork, lumber, millwork, stone masonry, hardware, roofing, painting and glazing, plumbing, heating, and so on through the long list. Some of the builders had printed lists on regular estimating sheets. Thus for every building every item could

be checked off, whether used in the building or not, thus preventing any class of work being overlooked.

One of these lists is reproduced in connection with this article.

With this list checked off and quantities for each item taken off the plans, the real work of estimating begins.

Percentage Method

One builder's method was quite interesting. He figured up closely upon the main items of the building, as the brickwork, the lumber, millwork, etc., and

LEST YOU FORGET

Appended to this article is an approximately complete list of the items of material and construction of buildings. This is not intended to take the place of the lists of items that have been organized on a system and are on sale, but to show the builder the necessity of providing himself with such lists, if he would avoid the risk of forgetting what he contracts to furnish or to do.

took bids from subcontractors, and then figured the rest of the work upon percentages. For instance, painting would be a certain per cent of the millwork; hardware a percentage of the millwork, and so on throughout the list. It is interesting to note that this man is known among his competitors as an erratic bidder, yet a man who has been fairly successful. At times his bids are low and other times quite high.

Based on Material Men's and Subcontractors' Estimates on Lists Submitted

Another builder made lists of all quantities of work and submitted them to material men for prices, and to subcontractors for their estimates. With these prices and bids he then made his own estimates, reducing the subcontractor's estimates that he figured as being high. He considers these figures as cost, and when he has added them all together he decides upon the percentage to be

added. This percentage is based upor how close he thinks his itemized figures are to real costs. Thus the percentage covers his real profit and a per cent to take care of contingencies and underestimating.

Lets Material Men and Subcontractors Take Off Quantities and Give Estimates

One builder had the material men and subcontractors take off their own quantities and name prices to him. He takes the lowest of these, estimates the laboritems of his own forces, and adds al of these together, adding his profit to these figures. This contractor is known as one who may make a good profit or some jobs and poor on another, due to the fact that material men and subcontractors give him much trouble by omit ting items, and contending they did no agree to do certain work or furnish certain materials.

Gives Lists but Also Requires Materia Men and Subcontractors to Take Off Their Own Quantities

One other builder not only requires material men and subcontractors to take of quantities, but he also furnishes lists to them, stating that these are the item upon which their figures are based. Thu he has a check upon them and their prices. With these as a basis he estimates actual costs on his own work Upon the total thus obtained he figure a profit.

This contractor is very successful, no only in obtaining a large number of con tracts, but also in the profit he make upon the year's work.

Analyses of These Methods

It can be seen that in these various methods of estimating, that one builde has a number of chances of losing mones or else his prices may be too high. This is due to the fact that he figures upon averages and percentages.

The second builder is not accurate enough in his detail estimating. Thus he may get one job that has been figured close, but a second figured liberally (to which is added a percentage for contingencies) he loses by being too high Contingencies mean that one lacks either the information of the details of a job or the general knowledge of a business to make a real estimate of cost. In one

case his estimate may be the real cost, in another it may be too low, while a third may be cost plus a profit. To add a percentage for uncertain features and an additional profit means to bid too high a price against a careful and accurate bidder.

The third contractor likewise has uncertain features in his estimating, so that he has much trouble and fails to secure many jobs.

The last mentioned builder, first of all, has checks and safeguards upon his esti-

Metal:

4 Plain. 5 Corru 6 Decor 7 Open

Corrugated.
Decorative.
Open Mill Con-

mate. He figures cost only to himself. Thus, although the material men and subcontractors have profits in their prices, yet these figures are costs to the builder. With these as a basis he has only a few items upon which he must estimate. One will be the labor of framing and placing his lumber, the placing of millwork, and a few other materials. These items will seldom run over 10 to 20 per cent of the entire building. Thus he has reduced his estimating of costs to the minimum, and if these are figured

without profit, he is not duplicating his profits when he adds one to the entire job. His figures can be safe, yet low, and he will secure jobs on which the other builders have estimated too high.

Accurate Data the Safeguard in Estimating

The best practice in estimating means that the data upon which the estimate is made must be accurate. The results thus obtained are bound to be gratifying to the estimator.

A List of Materials and Construction After this Order is Invaluable to the Builder to Check Items that Might

Otherwise be Overlooked 9 Fancy Brick.
10 Hardwood.
11 Leather Work.
12 Ornamental Iron.
13 Plastic Work.
14 Sheet Metal.
15 Terra Cotta.
16 Tile.
17 Upholstery.
18 Wallpaper.
19 Hangings.
20 Textile Fabric.
21 Interior Marble. 5 Fittings.
6 Hot Air.
7 Corliss.
8 Triplex.
9 Compound. ELECT. BELLS, see FIXTURES. Paneled: BLINDS, see SHUT-Mirrors: Glass FIRE DOORS: BOILERS, see HEAT-10 Opaque. 11 Prism. Lights. 12 Hardwood. 1 Composition.
2 Metal.
3 Metal Covered.
4 Rolling. BRICKS, Common. 13 Stucco. 14 Mosaics. 15 Tile. 16 Wall Boards. BRICKS, Face. Sliding Enamel. 21 Interior Marble. 22 Mosaic. 6 Swinging. Enamel.
Glazed.
Opal Faced.
Por. Faced.
Rock Faced.
Vitrified.
Fire.
Matt. FIRE PLACES: Papered: 1 Mantels— 2 Marble 15 Bldg. Paper. 16 Wallpaper. 17 Reinforced Crte. 18 Skylights. 19 Voluted. 20 Wainscoted. 21 Wood (Ck. lbr.) DOORS. Mantels-Marble. Slate. Stone. Brick. Wood. Cement. Tile. 1 Auto. Swing
Closing.
2 Coiling.
3 Center-balance.
4 Double Swing.
5 Dutch. Salt Glazed. 9 Salt Glaze 10 Satin. 11 Wire Cut. 12 Glass. 13 Cork. 14 Mottled. 15 Flash. 16 Tapestry. 6 Fire—
Hollow Metal.
Metal Cov.
B'tt'n & Br'cd. Painted . Dampers. Water Color. Color. Enamel. .10 Grates FIREPROOFING: 7 Hanging. Asbestos.
 Hollow Brick.
 Hollow Tile. 7 Hanging.
8 Hinge.
9 Lifting.
10 Revolving.
11 Rolling.
12 Sliding.
13 Trap Doors. Gilded. Varnish. White Enamel. Shape of Bricks: hape of Bricks:
12 Ordinary.
14 Radial.
15 Mitre.
16 Ogee.
17 Skew.
18 Bull-Nose.
19 Cove, Gutter.
20 Octagon.
21 Quom.
22 Soffet-blks. FLOORS: JOORS:

1 Artificial Stone.

2 Brick, check kir under brick.

3 Cement.

4 Soapstone.

5 Creosoted Block.

6 Asphalt.

7 Rubber.

8 Composition.

9 Marble Slabs.

10 Sandstone Slabs. CEMENT. 1 Asbestos. 2 Caen Stone. 3 Frost Proof. kind MAKE: 14 Coreset.
15 Ordinary.
16 Hardwood,
17 S'tw'd.
18 Metal.
19 Metal Covered.
20 Sash Door. 4 Keenes.
5 Marine.
6 Tile Setting.
Cement—Cont. Cement—Cont.
7 Asphalt.
8 Finishing.
9 Furnace.
10 Marble Finish.
11 Portland.
12 Waterproofed.
13 White Cement. Kind of Bond: and of Bond:
23 English Cross.
24 Flemish Single.
25 Flemish Double.
26 Dutch.
27 Blind Facing.
28 Garden—Wall.
29 Stretching.
30 Heading.
31 Raking
32 Broken. 10 Sandstone Slabs. 11 Soapstone Slabs. 20 Sash Door.
 21 Screen Door.
 22 Slab Door Flush.
 23 Wood.
 24 W. Fcy.
 25 Glass, Plain.
 26 Frosted.
 27 Mirror. Floors: Parquet. 12 Striped. 13 Block. 14 Wood Carpet. CLOSET LINING. 15 Wood Carpet.
15 Quarter-sawed White Oak.
16 Quarter-sawed Red Oak.
17 Quarter-sawed English Oak.
18 Mahogany.
19 White Mahogany.
20 Mahajna.
21 Wood Mosaics.
22 Walnut.
23 Circ'sion W'l't.
24 Maple.
25 Teakwood. Camphor Wood.
Hardwood.
Cedar Wood.
Lath and Plaster.
Wallpaper.
Felt. 'Transoms over D's. 28 Plain Glass. 29 Prism. Glass. Type of Joints: ype of Joints:
33 Smooth.
34 Flush.
35 Rough Cut.
36 Flat Joint Jtd.
37 Struck Joint.
38 Weather Joint.
39 Tooled.
40 Rough.
41 Recessed.
42 Smooth.
43 Tuck.
45 V Joint.
46 Rodded Joint. 30 Bumpers. 31 Checks. 32 Springs. 33 Stops. 34 Paneled. 7 Asphalt.
8 Waterproof Cv.
10 Liquid Comp. COLUMNS AND ELECTRIC APP'TS. PILASTERS. Elect.—Cont. Batteries. Wood: Round. Bells. Burglar Alarm. Square. Octagon. Fluted. Plain. URNACE: Hot Air. Fire Alarm. Call Bell. Door Bells. GLASS: 1 Art. 2 Plain. Door Bells.
Dynamo.
Engine.
Motor.
Trim Lights.
Direct.
Indirect.
Semi-Indirect.
Drop Lights.
Switches. 2 Plain.
3 Prismatic.
4 Mirror.
5 Plate.
6 Sheet.
7 Single thick.
8 Double thick.
9 Triple thick. 6 Staved. Caps: COATINGS. 7 Concrete.
8 Brick.
9 Concrete Filled.
10 Sheet Metal.
11 Cast Iron. CORNER PR'CTOR. CASEMENT HDW. CEILINGS. Frescoed.
 Fumed.
 Glass and Steel. Finish: DECORATING: 10 Autbilite.
11 Advertwine.
12 Beveled.
13 Clear.
13 Colored.
15 Corrugated.
13 Embossed.
17 Figured. 1 Artificial Mble.
2 Artificial Stone.
3 Bronze.
4 Brass.
5 Curtains.
6 Cut Stone.
7 Draperies.
8 Face Brick. Outlet for Extra elec. conveniences.

ENGINES:

1 Gas. 2 Steam. 3 Turbine. 4 Vertical.

10	NATIONA	AL BUILDER	
1 Florentine. 19 Hammered.	Coarse Aggregate.	35 Single Action.	38 Tooled.
20 Iridescent.	Granite, Trap Rock.	36 Triplex. 37 Turbine.	39 Vermiculated. Kind of Joints:
21 Mosaic. 19 Sand Blast.	Native Rock. Gravel,	38 Centrifugal. 39 Rotary.	40 Raised Water
23 Venetian. 24 Royal Ribbed.	Slag.	40 Vacuum.	Joints. 41 Cut Reveals and
25 Jeweled. 26 Etched.	Cinders. Mark Size of Aggre-	Operated by: 41 Compressed Air.	Heads,
HEATING:	gate.	42 Steam.	42 Intersecting Profiles.
1 Hot Air.	MOSAICS: 1 Ceramic.	43 Hot Air, 44 Gas.	43 Raggles for Flas
2 Hot Water. 3 Steam, 1 Pipe.	2 Glass.	45 Oil. 46 Wind.	STUCCO.
4 Steam 2 Pine	3 Tile	47 Electricity.	TILES:
Heating—Cont. 5 Comb. Furnace and	5 Faience. 6 Marble.	RAILINGS (Stairs).	1 Germaic. 2 Plain.
Boiler. 6 Radiators.	7 Cork.	1 Brass. 2 Bronze.	3 Embossed.
7 Open Fireplaces. 8 Stoves.	PAINTS & STAINS: 1 Aluminum.	3 Iron, 4 Wire.	4 Enameled. 5 Encaustic.
9 Registers. 10 Ventilators.	2 Asphalt.	5 Wood.	6 Faience. 7 Relief.
11 Automatic Heat	3 Carbon. 4 Cold Water.	REFRIGERATION	8 Variegated.
Regulators. 12 Chain Heat Regu-	5 Copper. 6 Enamel.	Inside Icing. Outside Icing.	9 Brick. 19 Cement.
lators. 13 Boiler Alarm.	7 Fireproof.	Refrigerating Machines.	11 Cork. 12 Glass.
HOT WATER H'T'R:	8 Graphite. 9 Gutta Percha.	ROOFING:	13 Metal. 14 Rubber.
1 Boiler.	10 Lead and Zinc. 11 Metal Pro'ctive.	1 Felt. 2 Paper.	15 Composition.
2 Gas Heater. 3 Automatic Gas	12 Priming, Sizing,	3 Tar. 4 Gravel.	16 Clay. 17 Wood Fibre.
Heater. 4 Outside or inside	Stain. PANEL BOARDS:	5 Pitch 3" to " or	18 -Asceptic. 19 Roman.
Meter.	1 Stationary.	more. 6 Asphalt.	20 Terra Vitrea.
KALSOMINE.	2 Rolling. 3 Coiling.	7 Cement. 8 Canvas.	21 Welsh Quarry. 22 Fibre.
LATH:	4 Metal and Plaster 5 Rib-Steel,	9 Composition.	23 Glazed. 24 Antique.
1 Metal. 2 Wood.	6 Solid.	10 Metal. 11 Rubber.	25 Painted.
3 Expanded. 4 Perforated.	7 Partitions. PAPER, BUILDING:	12 Prepared.	26 Marble. 27 Onyx.
5 Woven Wire.	1 Insulating.	Shingles: 13 Asbestos.	28 Opal. 29 Pebble.
6 Welded. 7 Composition.	2 Sheathing. 3 Waterproofing.	14 Asphalt.	TRANSOMS, see
8 Asbestos Block. 9 Plaster Boards.	PIPE:	15 Copper. 16 Glass.	DOORS.
10 Sheathing.	1 Cast Iron.	17 Lead. 18 Slate.	TREADS: Metal.
LIGHTING:	2 Wrought Iron. 3 Galvanized.	19 Tile.	Reinforced Concrete
1 Electric. 2 Direct.	4 Vitrified. 5 Earthenware.	20 Tin. 21 Wood,	Rubber, Soapstone,
3 Indirect. 4 Semi-indirect.	6 Brass. 7 Special Finish.	SASH:	Safety. Lead.
Fixtures for Gas:	8 Lead.	1 Hollow Metal.	Tile.
5 Wall. 6 Ceiling.	9 Nickeled. 10 Fittings.	2 Rolled Steel. 3 Wood.	Hard Steel. Dovetailed Brass.
7 Newel Post.	11 Brass, Nickeled, Porcelained.	4 Metal Covered. 5 Wrought Iron.	Carborundum.
8 Molding. LIGHTNING RODS.	PLASTER:	6 Leaded Glass.	TRIM: Fancy Brick.
LIME:	1 Asbestos.	7 Weather Stripping. SCREENS:	Terra Cotta. Stucco.
1 Allwood. 2 Coarse.	2 Boards. 3 Carton Pierce.	1 Metal,	Metal,
3 Ground,	4 Fibrous. 5 Gypsum.	2 Rustless.	Tile. Wood.
LOCKERS:	6 Lime.	SHINGLES, see ROOF- ING.	VENTILATORS:
1 Steel. 2 Wire,	7 Patent. 8 Ready Mixed.	SHUTTERS:	1 Fan Apparatus. 2 Coils.
3 Wood,	9 Plaster of Paris. PLUMBING SUPP.:	1 Metal. 2 Wood.	3 Furnace.
LUMBER: 1 Ash.	1 Bath Tub.	3 Rolling. 4 Swinging.	4 Screens. 5 Air Washer.
2 Basswood.	2 Shower. 3 Swimming Pool.	STONE:	6 Register. 7 Motors.
3 Beech. 4 Birch.	4 Apparatus for.	Stone—Cont.	8 Pumps.
5 Butternut. 6 Cedar.	5 Foot Tub. 6 Plate (Wash).	1 Artificial. 2 Crushed.	9 Window Apparate 10 Heating and Cool-
7 Cherry. 8 Chestnut.	6 Plate (Wash). 7 Urinals (Plate). 8 Urinals (Stand).	3 Monumental. 4 Structural.	ing Cahinet
9 Cypress.	9 Sitz Tub.	5 Field Stone on	11 Transom Bars. 12 Sash Openings. 13 Temp. Control.
10 Douglass Fir. 11 Elm.	10 W. C.'s Porcelain Stool.	Property. 6 Quarried Stone.	WALL COVERING:
12 Gum. 13 Hemlock.	11 Syphon Tank. 12 Low Set.	7 Native. 8 From	1 Boards.
18 Hickory.	13 Stationary Stands. 14 Bath Room Trap.	9 Cut Stone. 10 Blue.	2 Canvas. 3 Concrete.
15 Jarrah. 16 Karri.	15 Bath Room Hook	11 Marble.	4 Fabrics. 5 Granite.
17 Locust. 18 Mahogany.	Holders. 16 Rods, Plate Glass,	12 Lime. 13 Soapstone.	6 Gypsum.
19 Maple.	Shelves, Mirrors,	14 Slate. 15 Granite.	7 Metal. 8 Architectural.
20 Oak, Red. 21 Oak, White.	Baskets, Racks.	16 Gneiss.	9 Ornamental. 10 Trim,
22 Pine, White, Yellow, Norway.	17 Equipment to be Porcelain.	17 Sand. Finish of Face:	11 Stucco.
23 Redwood. 24 Spruce.	18 Iron Enamel. 19 Vitreous.	18 Axed.	12 Prepared. 13 Coatings.
25 Sycamore.	20 Soapstone.	19 Broached. 20 Bush Hammered.	14 Cork. 15 Fireproof Cov.
26 Walnut, Black. 27 Walnut, Circassian	21 Copper. Kitchen:	21 Chisel-draught	16 Fireproof Bldg.
28 Sycamore. 29 Tamarack.	22 Sink.	Margine, 22 Combed.	Block, 17 Kallastone.
30 Teak.	23 Tubs. 24 Drain Board.	23 Crandled. 24 Dragged.	18 Paint. 19 Paper.
MORTAR—Non-stain-	25 Slop Sink.	25 Droved.	20 Plates.
ing, painting. Hair.	26 Range. 27 Water Boiler.	26 Fish Scale. 27 Furrowed.	21 Terra Cotta. 22 Tile.
Fibre. Lime.	Laundry:	28 Ham'er Bl'c'ed. 29 Ham'er Dres'd	WEATHERSTRIPS:
Cement.	28 Sinks 29 Tubs.	30 Patent Ham'rd.	1 Felt. 2 Metal.
Gypsum. Fine Aggregate.	30 Slop Sink.	31 Pointed. 32 Polished.	3 Wood,
Sand on Premises	31 Drain Board. 32 W. C.'s Low Set.	33 Quarry Polished. 34 Quarry of Rock	WINDOWS:
White. Fresh Water.	PUMPS:	Faced. 35 Rusticated Joints	1 Bay, Oval. 2 Casement.
Marble Dust.	. 33 Duplex. 34 Plunger.	. 30 Kubbed.	3 Combination. 4 Pivoted.
		37 Saw Faced.	5 Reversible.

4 FOUNDATION-below surface

6 Sliding. 6 Sliding.
7 Square.
8 Double Hung.
9 Dutch.
10 Plain.
11 Revolving.
12 All Metal.
13 Composition.
14 Metal Covered. Frame: 15 Metal. 16 Wood. 17 Water Excluding Bars. WATERPROOFING: ATERPROOFING:

1 Cold, Bituminous
Dry-proof Paints.
2 Brick and Cement
Coatings.
3 Waterproof Compounds.
4 Paraffin Compounds.
5 Ingredient in. CONSTRUCTION LAND. t. lot x ft. deep x Date surveyed.
Old buildings removed.
Soundings for foundation.
Ft. to bedrock.
Water supply, city.
Water supply, private. Construction Camp. Excavation For. Ft. wide building x.
Ft. long building.
Ft. flush with bldg. line.
Ft. back from building line.
Ft. out from bldg. line.
Ft. deep below surface. To set Extra Excavation. xtra Excavation.

Cu. ft. for boiler and machinery.

Cu. ft. for pipe & wall trenches.

Ft. ft. deep to water main.

Ft. ft. deep to electric main.

Ft. ft. deep to electric main.

Ft. ft. deep to sewer main.

Ft. ft. deep for drains.

Ft. ft. deep for retaining wall

Ft. ft. deep for yard wall.

Pt. ft. deep for yard wall.

Ft. ft. deep for roadway.

Ft. hole. diam. for well.

Ft. hole. diam. for cistern. 1 FOOTINGS. 1 FOOTINGS.

Ft. below surface (level of).
On firm material, of concrete,
rubble or brick?
For solid wall construction or
For wall columns.
For wall and center columns.
On compressible material.
Ft. centers—well.
Ft. centers—interior columns.
Built by Use of
Bulkheads, cribs, cofferdams,
caissons, grillage or pilings;
of wood, metal, sand, or concrete. crete. 2 WATERPROOFING. Ft......ft. deep blind ditches.
Ft......ft. deep sub-soil drains.
Ft. to lower level.
Ft. to sewer.
By pressure system.
By non-pressure system. Damp Course. Walls, below grade. Asphalt Coating. Waterproof Paint. Membrane. Plaster Coat. Above Grade. Waterproof Paint. Floors. Membrane. Plasters. Paints. System. Intrigal. Plaster Coat. Inside. Outside. Work Waterproofed, i. e., Footings, arches, pits, grillage and column bases, boilers, vaults, Trenches, toilets, base-ments, other floors. Waterproofing On outside of walls. On inside of walls. On independent walls.

3 MORTAR. Material used

5 FRAME OF BLDG. Full or part framed.

Mill construction or steel.
Framed with light timber.
Ft.......x sills, bolted, or mortared to foundation.
Ft......x studdings at FLOORS. Floor Framing. Built up. uilt up.
Flat Arch.
Flat Slab.
Steel or Wire Woven.
Opposite Joints for Ceiling.
Filling between Joists.
Concrete Filling.
Insulating Material.
Under Flooring.
Platform for Galleries.
To hang from above.
Supported from below.
Carrying Capacity.
Ibs. to sq. it.
Glass Prism Lights.
Safety Tread.
Hygienic.
Enameling Finish for Concrete,
Mill Construction. Mill Construction. Ft. x sills bolted or mortared to foundation.
Ft. timber, wall and center col-Capacity of Floors. Lbs. to sq. ft.
Ft. roof rafters.
Ft. x ties at roof

grained, mill sawed, square edged, thoroughly seasoned, no large or loose knots. Kind of timbers used. Steel Construction. Ft. square, round, wall and interior.

I, sectional, built-up, or cast Accessories to Framing. ccessories to Framing.

Coal Hole Frame in Sidewalk.

Coal Door in Sidewalk.

Manhole.

Cesspools and Cover in Floors.

Bearing Plates.

Under Beams.

Under Girders.

Sockets in Sidewalk for Canopy.

Ash Drop for Fireplace.

Tarbage Closet.

Toal Chute.

Tireproofed with concrete hollow. Fireproofed with concrete, hollow tile, brick thick around col'ns. file, brick thick around col'ns.
Reinforced concrete construct'n.
Flat slab work.
Brick building.
Joist suspended between walls.
Roof, flat.
of pitch gable.
Suspended from top of walls.
Lintels over windows.
Windows arched.
Steel shapes, built up.
Cast iron. Steel shapes, built up.
Cast iron.
Lintels over doors arched.
Steel shapes, built up.
Cast iron.
Bolted to column.
Anchored to wall.
Metal lumber.
Cut stone sille. CONSTRUCTION 6 Inside Walls. 7 Outside Walls. .. thick walls—solid concrete Reinforced concrete, bric reinforced concrete, brick, stone.

Types of joints, Face work.

Extensions for balcony, cornice brackets, portico, crestings and finals, chimneys, ings and mais, chimicy, copings.
... thick walls of artificial stone.
To drawings. To models.
Finish.
... Fireproof Walls
... Thick Bond Material
... Thick outside face material
... Thick inside finish material
Firestops bet. roof plates and roofing. Firestops bet, roof plates and roofing.

Damp Course
Hollow block? Asphalt?
W. P. cement?
Proof Supports—Columns.
Walls.
Window sills material.
Window and door lintels material.
Flues for ventilating for fireplace.
Flue lining—Material.
Chases, for plumbing work.
Heating pipes for electric work.
Pipes for heating for Electric work. Pipes for heating for Electric work. Chases—thickness of wall. Chases and recesses not to av-erage over ¼ whole area of face of wall for any floor.

Brick Work. Common. Selected? Run of rill? Type of joints. Design of work.

Brick Work, Face, Kind. Finish of face, Type of joint. Design of work. Mortar. Cut Stone Work. Kind. Finish of face.
Masonry—Block in courses?
Ashler? Random course?
Broken 3 sizes
6 sizes. Dimensions. Bonding Anchoring. Special Arches. Vaulting. Domes. Copings.
Street fronts.
Yard walls.
Clamping joints.
Area coping.
Joggle joists.
Corner stones.
Cornices.
Lintels

Uses of cut stone, base? ises of cut stone, base?

Bearing? Bond? or Caps?

Sille? or all of the wall?

Design of work?

Cut to drawings or to model?

Curb, fence, flagging.

Garden accessories.

Sills, copings, lintels.

Gutter.

Vaulting

Paving.

Columns.

Paste.

Mantels.

Panels.

Stairs.

Pedestals.

Trim.

Sills, steps.

Cap stone.

wibble Stone—Masonry. Rubble Stone-Masonry. Random, rubble? In courses? Undressed? Squared? Sneeked? Set dry? In mortar? Joints—Dressed? Flat? Flush? ints—Dressed? Flat? Flush?
Rough or cut flush joint?
Flat joint jointed? Struck joint?
Weather struck ioint? Tooled?
Recessed rough? Smooth?
Tuck; or bastard tuck joint.
V joint, todded ioint.
Stone. No. Kind. Stone. No. Kind.

Gield Stone on Pops. Property.

Quarried.
Bedding in full bed of mortar.
Bonding—Headers through wall.
Distribution of headers.
Chimneys of rubble-stone.
finish (check above).
Terra cotta work. Architectural
drawings to show jointing,
bonding, anchoring and other
constructive features.
Serial numbers of blocks.
Models of full size plaster.
Damp course.
Protecting waterproofing.
Backing for damp-proofing.
Cement. Independent walls.
Half size models.
Models to be photographed.
Types of joints.
Temporary timberwork.
Included in contractor's bid.
Templets to details of drawings.
Templets to details of drawings.
Templets to details of models.
Work fitted at factory.
... Thick ribs.
Color scheme.
Bonding Anchoring.
Back Jenes? Sprear? Field Stone on Pops. Property. Box? Hook? Screw? Spear? Star? Anchor cornice? Column caps?
Blocks?
Tabling? Cement joggle? Dow-Pebble joints? Clamps? Plugs?
Anchor bolt? Rag bolt?
Finish of face (see cut stone).
Terra cotta fireproofing.
. Thick hollow tile.
% Hollow space in blocks.
.. Thick webs. Frame bldg. outside.

Ship lap? Tongue and groove?
Corner boards. Foot boards.
Metal corner strips.

8 Arches.
Rough. Gauged. Arches.
Rough.
Drop.
Equilateral.
Four centered
Segmental.
Stilted.
Stilted.
Stilted.
Gauged.
Elliptical.
Flat.
Lancet.
Semi-circular.
Skew. Segmental.
Skew.
Three-centered.
Provision for stability.
Tie rods. Anchors.
Buttresses—Box hook, screw, spear, star, clamps. Ceilings. Rib and panel. Side walls. Retaining walls. Lintels. Plate rail. Lathing. Check under lathing material column.

NATIONAL BUILDER

Paper lined. Paper lines.
Stucco. Ko
Terra cotta.
Ship lap. T.
Hardwood.
Lath and plaster. Kellastone T. & G.

Old Frame Bldg.

Repaired. Chases for plumbing, for ven-tilating, for electrical work. Other details.

Trussed

Flat. Pitched. of pitch.
Light framing with mill construction.
Wooden rafters.
Check kind of lumber used.
Steel rafters.
Single framing.
Double framing.
Triple framing.
Wooden trussed.
Steel trussed.
Arch rib trussed.
Triangular trussed.
Collar beam trussed. Collar beam trussed.
Lattice work trussed.
Ornamental exposed work.

9 ROOF.

Style of Roof

One gable. Observatory. Dormer windows. Cupola. Parapets. Torrent. Skylight.

10 HEATING Units.
Steam power plant.
Low pressure.
High pressure.
Vacuum atmosphere or vapor system.
Steam, hot air, hot water.
Gas, fireplace, coal.
Hearth, brick, concrete.
Stone, tile, gas logs.
Sq. ft. radiation.
Radiation, direct.
Radiation, indirect.
Warranty by contractor.
Noiseless, specific temperature at zero, with steam stated.
With water stated.
Perfect circulation.
Perfect operation for term of years. Units.

Minimum heating surface. Kind of boiler (check boilers). H. P. 2-lb. pressure.

H. P.
2-lb. pressure.
Setting, foundation, walls,
arches.
Steam tongues, separators.
Superheaters, tanks.
Piping, fixtures.
All under one contract.
Mechanical stoker.
Smoke provision.
Boiler and pipe covering after
approval.
Temperature controls.

approval.
Temperature controls.
Furnace, Stoves.
Ft. of flues.
Ft. of pipes.
Combination furnace and boiler.
Combination gas and coal boiler
Water heating.
Garbage water heater.
From main boiler.
Kitchen range.
Automatic gas heater.

11 VENTILATION.

Mechanical system, check. See ventilators, material column.
Hot air furnace wall flues.
Roof vents.
Casement window.
Window apparatus.
Warranty, term of years.
Perfect operation.
Cu. ft., air supply and exhaust. umn.

12 PLUMBING. 2 PLUMBING.

To include water supply.
Pumping machinery, gas.
Fittings, drainage and speaking tubes.
Contractor to do patching for all installation, including his own and other.
Repair all damage.
Stained walls, etc.
To do his own excavation.
To properly refill all excavation.
Pipe for water.
Pipe for gas.
Pipe for gas.
Pipe for sewer.
PUMPS. KIND

PUMPS. KIND.

PUMPS. KIND.

Capacity.
See plumbers supply.
Check. Kind.
Material column.
Provide for uniform fall.
Vent pipes, syphonage or back
pressure ventilating.
Drainage, flashing, cleanouts,
traps, catch basins, etc.
Water test, air test.
Smoke test, sulphur test.
Filtration apparatus.
Water distilling apparatus.
Water softening apparatus.
Exposed piping.
Concealed piping.
Concealed piping.
Plumbing fixtures in numbers.
Basement.
Kitchen.
Bath Room,
Lavatories.
Halls.
Bed Rooms.
3 ELECTRICAL WORKS.

13 ELECTRICAL WORKS. City Current. Isolated Plant.

Contractor to submit detailed

Contractor to submit detailed drawings.
Contract to include lighting fixtures, reflectors, shades, globes, etc.
Conduit for wire to be concealed, exposed.
Canopies for outlets.
Lighting to be—
Direct.
Indirect.
Semi-indirect.
Wall lights.
Drop lights.
Arch.
Check by number.
Ceiling, to show location of lights.
K. W. hrs. total.
Time switch.
Or bells, check "Electric Appanaments."

For bells, check "Electric Apparatus," material column,

14 ELEVATORS.

Passenger size.

Lbs. pressure.

Ft. per minute.

Freight, size

Lbs. pressure.

Ft. per minute.

Plunger power.

Electric. steam Electric, steam, gas. Street lifts. Dumb waiters.

15 FIRE ESCAPES

Steel stairs. Iron stairs. Apparatus.

16 STAIRS.

6 STAIRS.

Main stairway.

Wood, plain.

With safety tread.

Wooden newels.

With lighting fixture.

Wooden railing.

Cast iron railing.

Wrought iron railing.

Straight up.

Platform.

Spiral.

Steel construction.

Concrete construction.

Steel and concrete construction.

Fancy iron rail.

Fancy iron rail.

Fancy iron rewels.

Fishers. Safety treads.
Check kind of "tread" material column.

17 STEPS.

Stone. Stone artificial. Concrete

18 AUTOMATIC SPRINKLERS

Outlets. Ft. piping.
Painting pipes.

19 CHIMNEY AND FLUES

Lining fire radia. brick. Caps, cast iron. Brick, Stone, Terra Cotta.

Canvas, Metal.
Roller window.
Beam wrapping.
Beds, wall.
Bridges.
23 Chutes—flue waste.
Coal, ice, mdse.
Straight spiral.

24 CABINET WORK.

4 CABINET WORK.

Bath room cabinet.

Built in mirrors, with columns.

Square, round, octagon.

Fluted, plain, staved with caps.

Alters, ceiling.

Panels, partition.

Mouldings, moulded.

Casings and base mantels.

Plate rail for dining room.

Window and door jambs.

Side boards.

Stair Railings.

Buffet, faciors.

China closets.

Stair railing. China closets.
Stair railing.
Newel Posts.
Grill work, lattice work.
Dry boards, sash.
Fireproof, veneered.
Doors, frames, ceilings.
Partition, wainscote.
Interior woodwork.
Porches, chick.
Columns, ceiling, floors.

25 PAINTING BLDG.

Color.
Check material column.
Trim.
Nails to be set, etc., all wood
work to be scraped and sand
papered.

26 HARDWARE.

Specified, make and type.
Nails, etc.
Pulleys, weights, etc.
Hinges, Handles, Hooks, etc.
Door checks, brackets, etc., or Furnished by owner. 27 Finishing Hardware. 28 Casement Hardware.

Who.
29 Gravity Tanks.
Gals.
Pressure tanks.
Gals.

30 LANDSCAPE ARCHITEC-TURE.

TURE.

Grading and filling for lawns, terraces, walks, tennis ct., golf links.
Gardens for flowers.
Shrubs, hedges, trees, vegetables.
Top soiling, sodding.
Roads, paths, fences.
Gates, entrances.
Bronze, iron, wood, concrete, stone, native rubble cut (check stone).
Entrance lodge, balustrades.
Benches, flower or porch boxes.
Trellises, urns, vases.
Rustic wood work, sun dial.
Weather-vanes, pergolas.
Lakes, Fountains.
Hitching post, flag staff.
Outbuildings.
Ornamental columns.

WHAT DO YOU KNOW ABOUT IT?

A Series of instructive articles on Estimating will begin in the December issue of National Builder. These columns will be open to discussions of this important subject, and questions answered or submitted to the experience of our readers. In the foregoing article the methods of three builders are described. What is your method, and how do you make out with it? Send in your contribution to this department. Another builder may give you as good as you send.

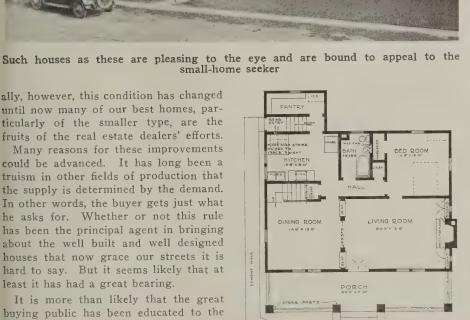
Built to Sell

TO anyone watching the developments I in the field of "houses built to sell" it must bring a thrill of satisfaction to note the many improvements brought about within the last few years. There was a time, and not so very long ago, when even the expression "real estate houses" was likely to bring forth expressions of doubt, or even worse. Graduhas erected some small houses recently that should point out the possibilities of this form of investment. Some of the houses are illustrated in this article.

Judging by results the Tracy Realty Company has hit upon a design that is favored by a large number of buyers. During the course of construction there were over five hundred inquiries received in bookcases on either side of the brick fireplace bring a vision of cosy winter evenings. If more wall space was desired the door between the living room and bedroom could be eliminated.

The problem of headroom over the basement stairs has been ingeniously solved by raising the floor to the height of a table. It might be considered more desirable to have the pantry adjacent to the kitchen, in which case the rear entrance and pantry could be reversed. This, however, would necessitate enlarging the basement which does not now extend under the pantry or rear entrance. A coal range is installed in the kitchen. It so happened that this particular owner preferred to have the wash tubs in the kitchen rather than in the basement. This is a matter of opinion and could be easily changed.

The stairs lead from the dining room to the center of the second floor, thus cutting the hall space down to a minimum. Four good bedrooms open from the hall. It will be seen that the result has been obtained with the least amount of partitioning. If one cared to add a little to the cost it would improve the plan to put a couple of closets between bedroom 1 and bedroom 2 and eliminate the one now opening from bedroom 1. This would add considerably to the size of bedroom 4 and give bedroom 2 better closet space.



point where it can appreciate good taste in designing and planning. As a rule nowadays successful homes find ready acknowledgment in some form or other. NATIONAL BUILDER is always ready to spread the glad tidings that its readers

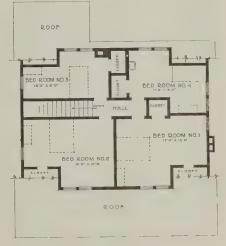
may benefit.

The Tracy Realty Company, of Cos Cob, Connecticut, is alive to the demand for small houses of attractive design. Mr. B. E. Schubert, who handles the construction end of this company's business,

least it has had a great bearing.

at their office and of course the houses sold like the proverbial hot cakes.

The plan of the first floor shows good ideas. The living room and dining room are separated by square posts and a pair of seats. This gives an open sweep and an impression of roominess. The built-



Because of the simplicity of the plan these houses are quickly erected. It is easy to see what this means to the man investing his money in a proposition of this kind. The price of labor is cut down, enabling the builder to use first class material throughout. It means also that the contractor can figure on a stable price of labor and material. That is to say, there is less time for the prices to fluctuate.

A Remarkable Feat

If You Find it Difficult to Get the Material You Want, Have the Initiative to Think Out a Substitute. The Variety of Resources is Widening, Not Narrowing—to the Builder Who Keeps Posted

THE accompanying illustrations show one of the most remarkable feats ever recorded in the history of reinforced concrete engineering. It is a combination arch and truss system composed

of the arch from spreading, thus taking care of the thrust which would otherwise require heavy abutments in the walls. The cantilever trusses intersect the arch at various points and are partly

modate. The structural members are reinforced with steel rods of special length so that reinforcement splices are avoided wherever possible.

The need for this novel method of cou-



A hundred-foot concrete arch substituting steel trusses to support a huge theater gallery with an estimated load of 3,000,000 lbs.

entirely of reinforced concrete structural members, designed to support the enormous balcony of a Los Angeles theater, without the use of any intermediate supports in the first floor space.

An examination of the illustrations shows that the arch construction is in two parts; the upper portion forming the arch proper, while the lower portion acts as a horizontal tie to prevent the ends

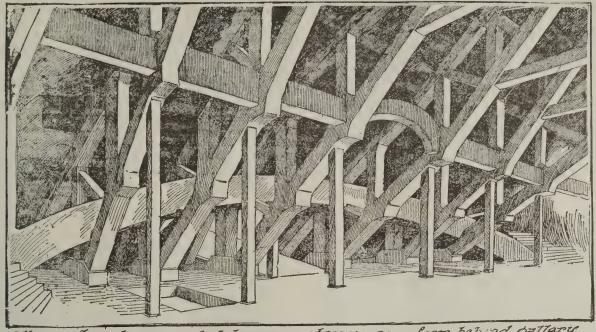
suspended from, and partly supported by, the arch and its tie.

The span of the arch is 104 feet and the depth of the balcony is 70 feet. The arch is four feet thick at the ends, three feet thick at the crown, and is ten feet in width. The construction is designed to support a load of 3,000,000 pounds, including the weight of the thousand persons which the balcony will accom-

struction arose from the fact that the owners of the building required that the balcony be carried on concealed supports and that the space under the balcony be entirely free from columns or other obstructions. Ordinarily a structural steel truss would be used for such a purpose, but in this case it was found that to obtain the necessary steel, fabricate it, and ship the truss from the eastern

mills would require more than a year's time. This delay was considered out of the question, so the architect and engineer, A. C. Martin, began burning the midnight oil. He recalled the use of re-

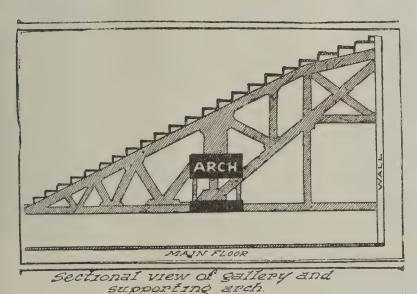
similar magnitude had ever before been attempted in the history of reinforced concrete engineering, but after long study and investigation the department gave its approval for the construction. unpleasant features that men like Mr. Martin show no hesitation when the need arises to turn aside from the beaten paths and blaze a fresh trail into new fields of endeavor.



The arch and suspended truss system as seen from betund gattery

inforced concrete arches in bridge design. By combining this form of construction with a system of cantilever trusses Mr. Martin developed a reinforced concrete structural system which

This story should carry inspiration to the man who feels that he must always depend on precedent to point the way for his achievements. Merely because a thing has never been attempted does



required no intermediate supports in the first floor space and also took the place of an all-steel truss.

When the drawings were first submitted to the members of the city building department they gasped with amazement at the revolutionary character of the scheme and were frankly dubious as to its practicability. So far as was known, no such complicated structure of

not mean that it is impossible nor impracticable. Of course, it requires a man of strong moral courage to step boldly into untried fields, especially so when many men who lack such boldness attempt to conceal their timidity by blundering into an attack on their more progressive fellows, but the rewards of such courage, both in material gain and in personal satisfaction, so far outweigh the

TESTS FOR WATER RESISTANCE OF PLYWOOD

A simple water-resistance test for the use of manufacturers of water-resistant plywood is the one developed in the early experiments with this material at the Forest Products Laboratory, Madison, Wisconsin.

Test specimens 5 inches square are sawed out of the sample so that they are at least one inch from the edge of the panel. A specimen is placed in boiling water for 8 hours, and upon examination at the end of that time should show no separation of the plies. A more prolonged test is made by the immersion of a specimen in running cold water. The soaking is continued for 10 days, during which time there should be no separation of the plies.

For an actual strength test of boiled or soaked plywood, a specially cut specimen and a testing machine are required. Descriptions of these may be obtained by addressing the director of the laboratory at Madison.

DRIVE—DON'T DRIFT

The builder who just drifts along stands in his own light. When he doesn't get ahead it is usually his own fault. It ought not to be at all necessary to work night and day and there is no reason why a contractor should not have as much leisure to enjoy life as any other business man. He can if he will plan his business to better purpose.

INTERIOR WORK

Saving Money in Millwork

In This Department Matters Relating to Interior Work in Construction and Decorating Will be Discussed Each Month. The Discussions Will be Confined to a Single Topic in General. Experiences in Interior Work are Requested from Contributors at Paid Rates.—Editor.

By William Robinson Safford

CONTRACTORS who purchase mill-work for jobs will find a wide variation in prices, as a usual thing, and often they are puzzled to know the reason. Most contractors think they can estimate

technical branch of the building business. Most contractors are fairly familiar with it, but few can sit down and make an accurate estimate of costs. It takes a mill man, one who is familiar with the

another may make a difference of a cent per foot. In a large order this would affect the total cost considerably.

In these days of high prices every item which contributes to boosting cost





Plate A

Plate B

Plate A—Unusual dining-room in a Middle Western home where a rich effect was obtained by the use of simple bands of wood. The buffet is of a special design such as can be undertaken by the special department of any of the big millwork supply houses. Plate B—A unique design for a bookcase, made up of simple members depending upon the grain of the wood for its architectural effect. Millwork such as this should be specially selected for the purpose

millwork quite as accurately as the mill men, themselves, and frequently they put in a bid for a job without going through the formality of taking mill figures. When they go out to get prices on millwork later, they are astonished to find that this work costs from 5 to 10 per cent more than their estimate.

The fact is that millwork is a highly

latest lumber and labor costs, to intelligently estimate millwork, and no man can well do this unless he is right in the mill business.

Millwork varies in cost according to the size of lumber employed and the pattern of the machine work. Just the difference between the cut on one crown molding as compared with the cut on without benefit should be rigorously repudiated. One of the places to cut down the high cost of production is in millwork; this applies to window and door frames, exterior cornices and interior trim and doors.

Quantity production in a mill always reduces costs and that is why stock patterns of millwork are more economical





Plate C

Plate D

Plate C—Stock doors and trim were used in this living room, finished a beautiful silver-gray. The seats and railings were "specials," but, being of a simple design, were easily executed at moderate cost. Plate D—When it comes to elaborate Colonial work much of it is made to order in the "special work" department of the mill. However, many china closets similar to those illustrated, as well as Colonial mantels, can be purchased from catalog

than special patterns. Take window frames, for instance. Time was when nearly every architect and contractor had his own particular type of frames. Some contractors specified certain methods for putting together the pulley stiles and parting beads, and in those days most of the frames were complete "box" frames, with, of course, a certain waste of lumber.

The tendency now is to use as much as possible one type of frame—a frame in which the amount of lumber is reduced to the minimum, and in which the method of assembling is labor saving. Although these frames cost less than former frames (on a basis of the new costs) they are not necessarily of any poorer quality. When well made of a good grade of lumber they are just as desirable as for-

mer more extravagantly designed frames. It means, simply, that the mill situation has reached a higher and more scientific period of development in which efficiency counts most and waste is eliminated.

The standardizing of sizes and patterns of sash and frames has done much to reduce waste in millwork, for standard sash and frames mean, also, a more or less standardization in prices. Using practically the same pattern of frames in every job the contractor can tell somewhere near where he gets off in the frame situation. Using stock frames one house costing a certain price will cost about the same the next year, plus any advance caused by increase in material and wages. In the manufacture of doors there is another opportunity to save money by standardizing patterns. A few years ago "stock" doors were used only on cheap work. Architects and builders, when building houses of high grade, thought that the only way to get a good job was to design doors specially and have them made in the local mill. Door manufacturing has now come to be a highly specialized branch of millwork and builders have found that "stock" doors are superior to the local article made in local mills

Designs of stock doors have been so improved in character that purchasers can now select from the catalogs of reliable manufacturers any style of door required. It is no longer necessary to

design special doors for each architectural style, as the door manufacturers have already done this. As a matter of fact "stock" doors are usually made better than the local mill can make them because door manufacturers, after years of experience with modern door machinery, can turn out a better product than the ordinary mill, and at less cost. Door making is almost automatic in a large mill specializing on this product, and the labor cost is reduced to the lowest possible point. For this reason "stock" doors can be made in competition with special doors and contractors will usually find them lower in cost and better in quality than the latter.

The same thing applies to interior trim. In the catalogs of reliable and

responsible concerns will be found patterns of trim to fit any style of architecture. Architects who formerly insisted upon designing every foot of interior trim now frequently select ready-made trim and receive in return excellent material molded along correct lines and delivered more quickly than local mills can turn it out, and at less cost.

One of the ways to reduce the cost of building is to eliminate elaborate interior moldings and substitute patterns that are simple and which can be built up of small pieces, reducing lumber and labor to the minimum. An example of simplicity handled in an elegant way is shown in Plate A, illustrating the interior of a dining-room in a



Plate E—This buffet and the two china cupboards are similar to the stock designs procurable at many of the big mills specializing on interior finish. The plate rail, panel mouldings and beams are all of stock designs, such as may be picked out in many manufacturers' catalogs

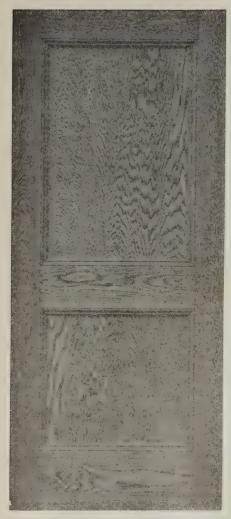


Plate F—A "stock" door such as is carried in the catalogs of most of the standardized mills

palatial residence in the Middle West. This trim, of oak, consists of plain boards with a simple little molded backband. Trim of this character is now carried in stock by many manufacturers.

An example of interior cabinet work specially made is shown in Plate B illustrating a bookcase of unique design.

Another example of special millwork, such as can be manufactured by any reliable mill having a special millwork department, is illustrated in Plate C, showing oak trim finished in the popular silver-gray color. The door is an ordinary stock design, two paneled. Casings and plate rail are stock patterns, such as can be purchased from any catalog, but the seats and railings are special, though of simple, inexpensive pattern.

When it comes to the more elaborate millwork of a Colonial interior, such as is shown in the dining-room illustrated in Plate D, it is necessary to have a special design, drawn either by the architect or submitted by the designing department of the mill. Stock millwork can be used throughout the house for the main trim and special places may have trim specially designed like that

shown in Plate D. All the goods can be shipped when wanted, with the assurance that it will go together on the job with the least amount of carpenter labor.

A good example of a sideboard of "stock" design is shown in Plate E, and many manufacturers carry similar designs in stock. In this case it is merely necessary to send to the mill the dimensions of the room and they will build the sideboard and china cupboards to



Plate G—Compound paneled doors are sold ready-made by dealers and can be depended upon to give a rich effect to any room. They are extremely serviceable and housewives like them because there are no panels to dust

order, shipped knocked-down ready to put in place at the building. Usually a pattern of this sort can be purchased cheaper in this way than if made by the local mill. The plate rail, panels and beams in this room are all of stock pattern.

Stock doors are of many patterns, one of the least expensive being shown in Plate F, a justly popular type. Plate G shows a compound panel door now welcomed by architects and builders where an elegant and refined effect is wanted; Plate H indicates the form of construc-

tion of these doors, the cores of which are built up in small pieces to which the compound veneer is applied.

Veneer of specially selected wood is used and every effort made to secure effects of grain that will enhance the appearance of doors as much as possible. Inlays of bands of wood of different color can be furnished and are very decorative.

A stock pattern of outside doors, especially effective for bungalows, is shown in Plate I. These doors come in varying thicknesses and are usually of soft wood for painting, though some dealers carry them in hardwoods, for varnishing.

In addition to stock designs for china cupboards and buffets representative manufacturers carry a complete line of pantry cases which will be found, in convenience, the equal of any designed especially for the purpose by kitchen experts. The majority of these have drawers or paneled doors below, and glass doors above, and the shelves are frequently adjustable.

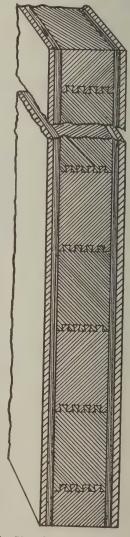


Plate H—Showing the sturdy construction of a compound panel door. These doors are economical because they utilize small pieces of lumber. They are very serviceable for the same reason

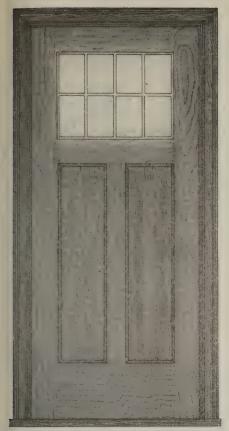


Plate I—Here is an outside door which has proved very popular with architects and builders. Doors like this can be procured in all sizes and are carried in stock by most dealers

Mantels for fireplaces are also kept in stock by many mills and there is a wide

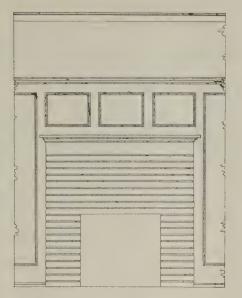


Plate J-Mantel designs are tending toward simple lines, partly as an economy and partly because taste drifts that way. This is brick mantel with a plain wood top and wood panels on the wall

variation of designs covering any architectural period. The tendency is toward simple mantels, like that illustrated in Plate J, in which there is an ordinary mantel shelf above, and frequently a few plain panels against the wall.

To keep pace with the high cost of building, experts are studying methods of reducing costs by greater efficiency in labor and in the use of material. The

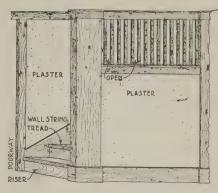


Plate K—As a real economy in building try a box staircase in your next job. With a plaster rail below and simple balusters above much of the cost of a "fancy" staircase is eliminated

big mills of the country, fresh from their war-time experience, when they were called upon to deliver enormous quantities of material in the quickest possible time, are geared for the best of service to civilian consumers. They have developed "stock" designs of frames, sash, doors and trim to the point where beauty is not sacrificed. Many of them have exterior cornice moldings, shutters and blinds, and porch posts and railings standing in their warehouse ready to ship, goods of the highest class and of good architectural types, and usually at prices lower than local mills can quote.

This is a genuine economy which is truly tending toward the lowering of building costs, and is therefore very welcome to builders and architects.

Changing a Dining-Room into a Bedroom

THE BEDROOM shown in the accompanying illustration was formerly a dining-room, and the combination of built-in features to be observed extending across one end of it originally constituted a buffet, or built-in sideboard, with a china cupboard at either side. To meet the changed requirements of the room, the middle section of the combination has become a very practical dresser, with a total of 10 drawers of three different sizes and a deep countershelf to serve as a dressing table, while the two china cupboards have been converted into wardrobe closets.

To convert the group from diningroom features into desirable bedroom conveniences, very slight alteration was necessary. In fact, the middle division required no changing whatever, and the corner or end features have merely had paneled wood doors substituted for the original glass doors and the shelves removed from the lower and larger compartments. With these minor changes the built-in feature has become appropriate and practical for a bedroom.



The built-in feature that originally comprised china cupboards and sideboard has become a combination of wardrobe closets and dresser

An Unusual House

MODERATE size houses offer larger possibilities in the way of individual treatment than do small houses. Moderate size houses usually remain in the possession of the original owners for longer periods of time than do small houses, and for this reason they usually offer opportunities for designs of a more original nature.

As a rule, small houses pass through

The accompanying illustrations show a house designed by Charles P. Rawson, architect for J. B. Johnson of Kankakee, Ill. The house is unique, both in plan and in its exterior appearance. It has that "different" air that is so admired by many people, and yet it isn't freakish. It is a house that is full of clever ideas that might be adopted in solving many problems of a similar nature.

The construction of the exterior walls is of hollow tile; all copings and the basement floor and walls are of concrete; all framing is of wood, and the roof is of wood shingles. Birch trim is used throughout the interior, and all floors, with the exception of the kitchen, are of oak.

The combination of the garage with the house is a feature that has several



An unusual and attractive home. Chas. P. Rawson, Architect

several ownerships during a lifetime and they must be designed in such a manner that they will fulfill the requirements of the average family, and therefore find a ready sale. On the other hand, moderate size houses often remain in the same hands for several generations, and it is not considered necessary to pay so much attention to their future selling value.

This fact is, no doubt, largely responsible for the attractiveness for which our moderate size houses are noted. Their charm is often due to the conscious expression of their owner's real tastes and desires. The owner of such a house has to consider the requirements of only his own family, without thinking of the feature which a prospective buyer might consider unsatisfactory.

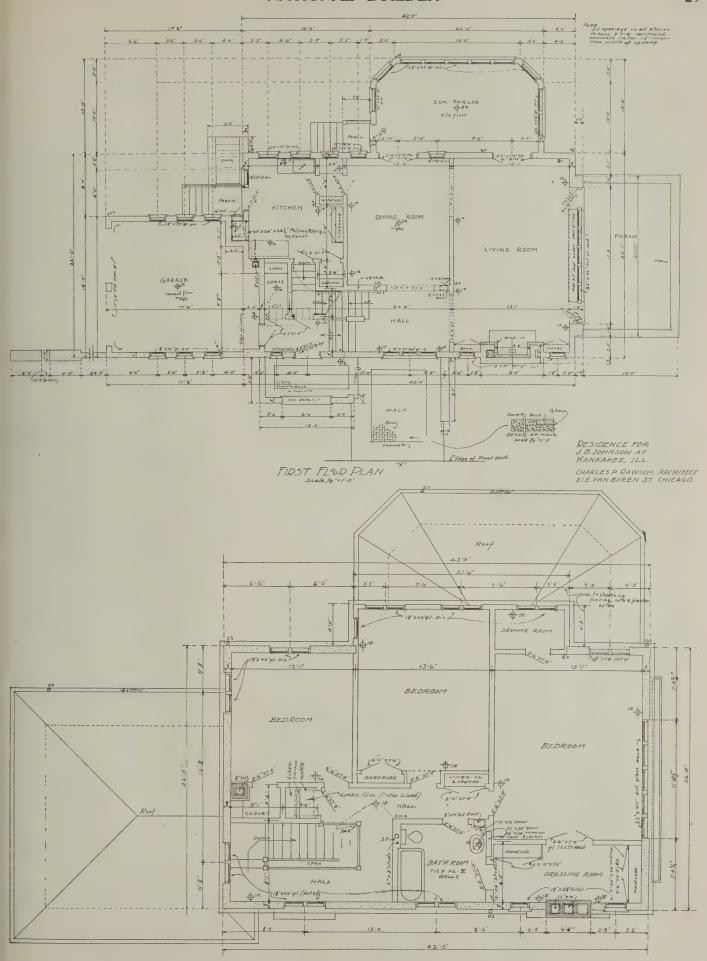
This house was designed for a triangular shaped lot, but it is equally appropriate for a corner lot, or even for an inside one, providing that there should be enough ground to make a side entrance practicable. The exterior design belongs to the so-called "Prairie style" of architecture which has come to be identified as a typically Mid-Western style, although examples of it are to be found throughout the country.

The perspective shows a rather interesting composition which depends on projections for its effect. The wide roof overhangs, the simplicity of the moldings, and the breaking up of the wall surface by shallow projections are characteristics of this style. The finish is of stucco, which makes a very appropriate treatment for such a house.

practical points to commend it. Among the other advantages of such a scheme may be mentioned the convenience of this location, and the fact that the house wall forms one wall of the garage and thus lessens the cost. The fire hazard is, of course, increased, but if the separating wall is of fireproof construction, as in the present case, this danger is lessened. If the roof of the garage were also of fireproof construction, the chance of fire spreading from the garage to the house would vanish almost entirely.

The walks leading to the house are a combination of concrete with brick panels. This makes a pleasing treatment that does away with the severity of a plain concrete walk.

The entrance may be said to be of the side entrance type. It opens directly



SECOND FLOOR PLAM
SOOK NOTES

into the main hall, which has two floor levels. At the entrance the hall is on a level with the garage floor and is comparatively narrow. If desired, this lower portion could be separated from the upper portion by means of French doors, thus forming a vestibule. A large coat closet opens off from this portion of the hall and there is a door which gives direct access to the garage. There is also a door which gives access to the kitchen and to the basement stair. Another short flight of steps leads to the upper portion of the hall, which is considerably wider than the lower portion. The accessibility of the hall should be noted; it can be reached from any room in the house, including the garage, without the necessity of passing through any other room. Wide cased openings open from the upper portion of the hall into the dining room and the living room. These rooms would have more privacy and would be more comfortable in winter if the openings were provided with French doors. The main stair also leads from the upper portion of the hall and the stair spandrels and rail and also the walls of the hall are covered with painted canvas.

The living room is 15 feet wide by 24 feet long and is well lighted and ventilated. At one end there is a large brick mantel flanked by book cases; at the other end, French doors lead to the sun porch. At one side there is a large group of casement windows flanked by French doors, which lead to the brick paved terrace. The radiators for this room are placed behind a large grille under the wide sill of these casements. On the other side, cased openings lead to the dining room and to the hall.

The walls of the sun porch are fitted with casement windows and a door opens onto the steps which lead to the yard. The sun porch is 12 feet wide by 23 feet long and is so located that one end may be used as a breakfast porch if desired.

The dining room is 13 feet wide by 16 feet long, and although it is almost an inside room, it probably receives sufficient light and ventilation through the wide cased openings and French doors with which it is provided. The walls of this room have a high wainscot made of tinted wall board divided into panels by wood moldings.

The kitchen is somewhat irregular in shape, but in general it is 12 feet wide by 13 feet long. There is no regular pantry, but there is a small pass pantry between the kitchen and the dining room; there is also a large closet which may be used for food storage. The kitchen also contains a built-in cabinet and a built-in refrigerator of the outside icing type. Doors lead from the kitchen to the rear porch and to the basement stair.

The garage is 16 feet and 8 inches wide and averages about $16\frac{1}{2}$ feet long. It is designed for two cars and has a double entrance fitted with sliding doors, which slide around flat against the side walls. These doors have glazed panels, and together with the six high casements, furnish good light. A work-bench, a locker and a gasoline supply tank and pump would add to the convenience of the garage.

The second floor contains three large bedrooms, the bath and an ample supply of closets. The portion of this floor which extends over the sun porch has frame walls to lighten the construction. These walls are stuccoed to match the other exterior walls.

The front bedroom is 15 feet wide by 18½ feet long. A long flower box is formed just under the large group of casements. This room is decorated with wall board divided into panels by wooden moldings. It opens into a small sewing room at one end and into a dressing room at the other. The dressing room is fitted with built-in wardrobes and opens into the bath. This makes two doors into the bathroom, and is usually considered an objectionable feature, as the necessity for the locking and unlocking of two doors is somewhat annoying.

The remaining bedrooms do not have good ventilation. The bedroom next to the principal one would probably be more satisfactory if the small linen closet were changed into a wardrobe, thus giving this room more storage space.

The hall is rather wasteful of space and too many turns are required in passing from the bedrooms to the head of the stair. The large linen closet is lined with cedar and is fitted with built-in drawers. The cedar gives a pleasant odor to things stored in the closet, and is especially desirable for closets which are used for the storage of blankets during the summer.

HOW TO RETAIN THE BARK ON LOGS USED IN RUSTIC CONSTRUCTION

For preventing the bark from flaking off logs used in rustic structures, the Forest Products Laboratory, Madison, Wis., recommends the following methods of seasoning and preparing the timbers as the most effectual:

1—Cut timbers late in summer and score on two sides; that is, cut off narrow strips of bark for the entire length. Pile in shade in open pile to allow thorough circulation of air. Allow timbers to season until following spring or summer before using.

2—Proceed as in (1), and in addition, coat ends, stripped portions, and knots with coal-tar creosote, using one coat a

few days after timber is cut and another just before using the timbers.

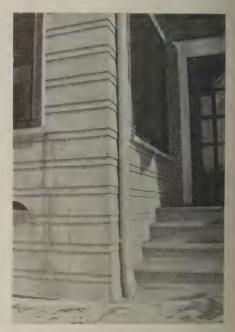
3—Proceed as in (1), but do not score bark. When timbers are in place, tack bark on with large-headed nails, placing one to every square foot of surface. Paint heads of nails to resemble color of bark.

4—Tack or nail the bark on without particular attention to time of cutting or other treatment.

The nailing method has been used successfully by one western company which maintains numerous rustic hotels, and also on a large rustic building erected for exposition purposes.

VARIETY IN SHINGLED SURFACES

That so minor a detail as a shingle course is capable of variation is illustrated by the accompanying photograph. The effect is attractive and is obtained by alternating wide and narrow courses of shingles. The shingles were dipped in silver-gray stain and the wide courses are exposed 6 inches to the weather, while the narrow ones are exposed only 2 inches. This method not only offers a



Alternate wide and narrow courses of shingles

"different" surface treatment, but the double thickness of shingles makes a tighter wall than does the customary single thickness. This advantage will be especially appreciated by those who have recently had occasion to figure up a season's fuel bill.

Other methods of obtaining variety in shingled surfaces will be suggested by this example. Those who are interested may derive considerable pleasure during spare time by working out different designs for shingle courses.

ENTRANCES

The Examples Shown Hereunder and in Each Issue of National Builder Will Aid in Suggesting an Appropriate Entrance Design



No. 1—A wooden entrance in the Colonial style, with a cement platform and wrought iron rail. Note the design of the brick walk.



No. 3—An entrance to a two-flat building. The balcony is shaded by an awning which makes it a comfortable spot on hot days.



No. 5—An auto entrance at the side of the house. The hood is a weather protection when getting in or out of the car. There is a sleeping porch above.



No. 2—A hooded entrance somewhat English in design. This type is economical and is very effective if well designed.



No. 4—A variation of the hooded type. The columns are engaged with the wall and give an impression of being used as supports for the heavy brackets.



· No. 6—A novel combination of an entrance with a bay window. The bay window opens on the stair landing and forms an attractive feature, outside and inside.

Notes on Reinforced Concrete

THE USE OF CONCRETE in building construction dates back thousands of years. The Egyptians and the Romans used it extensively, and the ancient builders of Mexico and of Peru were apparently familiar with its use. Reinforced concrete, however, is a comparatively recent invention, and it is only within the past 20 years that it has come into general use in America.

Probably the first man to use concrete reinforced with metal was a Frenchman, M. Lambot, who, in 1850, built a small rowboat of this material. From this time on investigations and experiments were carried forward by engineers and scientists until by the late 70s enough data had been accumulated to make practical use of the combination of concrete and metal. In those days the most popular system was that of Melan, in which I-beams and T-beams were used as reinforcement, forming what is now known as the armored type of construction. This system was employed extensively in the construction of arch bridges.

In America the first real application of reinforced concrete to building construction was in a building erected by W. E. Ward in the year 1875, near Port Chester, N. Y. In this building all of the structural members, including exterior and interior walls, floors, roofs, and so forth, were composed of concrete reinforced with iron rods and light beams. Between 1877 and 1892, H. P. Jackson, E. L. Ransome and G. W. Percy designed and built a number of reinforced concrete buildings in California. These men may be said to have been the pioneers in the use of the new type of construction in this country.

Since about 1896 the development in the use of reinforced concrete has been remarkable. For some years its use has had the unqualified approval of the progressive architects, engineers and builders throughout the civilized world, and its value to modern construction is unquestioned.

The assumptions under which reinforced concrete structural members are designed require that certain conditions must be met in order that the members may develop their full efficiency. Drawings and specifications, especially those for minor work, are often rather indefinite with regard to the methods that are to be followed in placing the concrete, the spacing of reinforcement, and in other important respects, but the builders should realize that a reinforced concrete member for a small job has exactly the same relative importance that it would have on a large job, and that

if it is to be considered safe it must be constructed with the same care.

A large proportion of the failures of reinforced concrete construction have likely been due to poor construction, rather than to poor design. The following data follows good practice in reinforced concrete construction and covers the more important features which govern its safe use.

The Concrete

In ordinary concrete work, mass, or dead weight, is usually the most important requirement. In reinforced concrete, however, the chief qualities are its strength and uniformity. For this reason concrete that is to be employed in reinforced work should be even more carefully made than is customary for The ingredients ordinary concrete. should be carefully selected to obtain the best results and should be free from dirt or other foreign matter. The stone or gravel should be hard, durable and uniformly graded from small pieces of 1/4-inch diameter up to larger pieces that will pass a 3/4-inch square mesh, or at the most a 1-inch square mesh. Thus it is seen that the largest stones must be considerably smaller than is permissible for ordinary concrete where 11/2-inch diameter, or even larger ones, are commonly used. The use of the smaller stones allows the concrete to flow around the reinforcement to better advantage than the larger ones would per-

Sand

Many failures of concrete are due to poor sand. The sand used should be graded from fine to coarse, with the coarse grains predominating; the largest particles passing a ¼-inch square mesh screen. There is some difference of opinion as to whether the grains should be "sharp" or rounded. Many authorities maintain that as rounded grains will compact into a denser and stronger mass than angular grains will, the rounded ones are to be preferred.

Only portland cement should be used for reinforced work, and it should be of a brand manufactured by a reputable mill. It should be fresh and free from lumps. The water used for mixing should be clean and free from oil or vegetable matter.

Proportions and Mixing

The customary proportions for reinforced work are one part cement to six parts of aggregate. That is, one part cement, two parts sand and four parts of stone or gravel. All proportions to

be accurately measured by volume. In important work the best proportions to use are usually determined by means of tests, but a 1:2:4 mix is considered safe for the average run of materials.

The concrete should be a "wet" mix that will readily flow to all parts of the forms without excessive tamping. A "wet" mix is of such a consistency that it will run off of a shovel unless handled rapidly, but too much water makes a "sloppy" mix that is undesirable.

Mixers

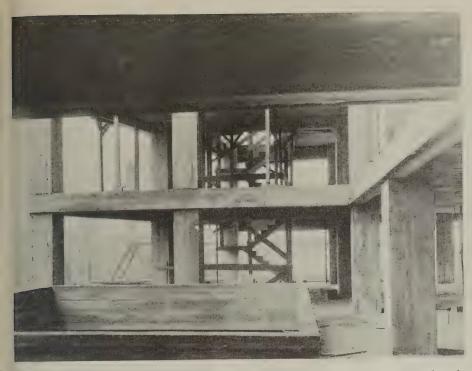
Aside from the advantage of economy, machine mixers should always be used in preference to mixing by hand, as a machine insures a more uniform and thorough combination of the materials. Thoroughness in mixing is the secret of strong concrete, and much care must be given to this important element of the work.

Placing of Concrete

The concrete must be handled rapidly and each structural member should be poured before another is begun. Concrete that has partially set should never be remixed nor retempered. Tamping should be carefully done. The concrete should be worked around the reinforcement rather than rammed into place. Care should be taken to avoid displacing the reinforcement while concrete is being placed around it. Columns should stand at least two hours before beams are poured over them.

The work should be planned ahead so that suspension of the day's work will have the least effect on the strength of the structure. Girders, beams and columns should always be completed in one operation whenever it is at all practicable, but where it is impossible to pour a member in one operation the location of the joint should be carefully determined. In such cases the joints of columns should be at the line of the bottom of the girders; the joints for slabs and beams should be at or near the center of the span, and the joints for girders should, in general, also be at the center of the span, but in cases where a beam frames into a girder at this point, the girder joint should be to one side of the center at a distance equal to twice the width of the beam. Slab, beam and girder systems should be poured together in one day wherever possible.

Great care should be used to prevent jars and vibrations from being transmitted to members which have been poured. Such jars will destroy the bond between the concrete and the steel and will often reduce the strength of the member to the point of failure. Walk-



No. 1—Most of the form work removed, but note temporary supports under the center of the second tier of girders and around the stair

ing over, or wheeling barrows across completed work should not be permitted for some weeks after pouring, if at all. Concrete which is poured during hot, dry weather should be protected against rapid drying by spreading wet gunny-sacking over it, or by other convenient means. It should be kept damp (not too wet) for at least a week. Freshly poured concrete should be protected against rain. Tarpaulins are frequently used for this purpose on exposed work.

Reinforcement which is to be left projecting from partially completed work for some time should be protected from rust. A heavy coat of cement mortar is often spread on the metal for this purpose.

When the method of spouting is employed in depositing concrete, the flow of concrete in the spout should be as nearly continuous as is practicable. The angle for the slope of the spout should be about two horizontal to one vertical, or, say, 27 degrees. The spout should be flushed with water both before and after each run.

Concrete should not be placed during freezing weather unless the ingredients are entirely free from frost or ice crystals, and unless precautions are taken to insure its setting and hardening before freezing. During such conditions the ingredients should be thoroughly warmed before mixing and the structure should be enclosed with canvas and provided with heat. The use of salt to lower the freezing point is objectionable. Salt renders reinforced concrete more liable to

attacks by electric currents, thereby destroying its strength and durability.

Forms

Forms for reinforced concrete work must be strong and unyielding and should be accurately located and dimensioned. For floor slab construction there are several excellent types of steel forms on the market. Steel forms may be used again and again, thus materially reducing the expense of form work. Some firms rent these forms to builders who do not care to buy them outright. Reinforced concrete joist systems, with hollow tile fillers, are also economical with respect to form work.

Lumber that is used for forms should be sound and straight. Two-inch stuff with four-by-four posts or shores is generally used. Several types of metal clamps for holding column forms together are on the market. These are economical with respect to both time and material. Forms should be so placed that they may be easily taken down without damaging the concrete. Wedgeshaped pieces are often nailed in the corners of forms to form chamfers on the edges of beams and columns; this prevents the chipping of corners when the forms are removed. Forms should be tight to prevent excessive leakage of water which will carry away a consider-



No. 2—Ten-foot cantilever overhang. Note the projecting reinforcement for the attachment of future work

able amount of cement. Drenching the forms with water or oiling the surfaces just before concrete is deposited in them prevents the concrete from drying too rapidly. Form lumber may be used several times, but it should be well cleaned of mortar, etc., before re-using. Forms should have all chips, dirt, etc., removed before concrete is placed in them. With column forms it is advisable to leave a

that a blow-torch flame be projected against the concrete surface in order to determine whether the concrete is frozen. Forms for frozen concrete must be left in place until the latter thaws and hardens.

As a general guide for the removal of forms the following table is given. This table is for use where the temperature has not fallen below 40 degrees during

Reinforcement

Reinforcing steel should be free from flaking rust, scale, or fractures. It should never be painted—good concrete will prevent the formation of rust after the steel is embedded. All steel should be of structural grade and new. Steelwire mesh, or expanded metal, are often used as reinforcement for slabs, small beams, or other minor details. Mesh



No. 3—All form work removed from first three tiers. Temporary supports under center of girders of fourth and fifth tiers. Bottom forms for girders of sixth tier left in place. All forms of two upper tiers in place

temporary opening at the bottom for this purpose.

The proper time for the removal of forms depends on several conditions; among others may be mentioned the span of the member, the climate, the season of the year, and the setting qualities of the cement which is used. When the concrete gives forth a ringing sound if struck by a hammer, it is usually considered safe to remove the forms, but frozen concrete will also give forth this sound, so in case of doubt it is recommended

the progress of the work. Even after the forms are removed ample supports to carry the construction must be left in place for some time.

reinforcement should be given at least 3 inches side lap and the longitudinal members should be spaced not to exceed 4 inches on centers, and the least

TABLE FOR REMOVAL OF FORMS

Bottom of beams and girders, 12-ft, span	3 4	days days
(Plus one day extra for each additional foot of span, up to 20 ft.) Concrete joists with tile or steel fillers, same as ordinary beams.		days

limension of mesh opening should be not less than 2 inches. There are on he market various types of deformed pars for which their makers claim several advantages over ordinary bars. The patents on square twisted reinforcing pars have expired and they may now be obtained from almost any iron works. Square twisted bars cost but slightly nore than plain round or square ones and are usually more desirable, as they

are on the market several devices for maintaining reinforcement in its correct position while the concrete is being poured. These are known as chairs, stools, spacers, etc., and should always be used on good work. They are comparatively cheap and insure accuracy. Reinforcement which has sagged or otherwise become exposed on the surface of members is considered to have no value as reinforcement, and such

square columns, the dimensions should not be less than 8 inches on a side. The unsupported length of a reinforced concrete column should not exceed 12 times the least diameter. Thus for an 8-inch column, the maximum length is 12 times 8, or 96 inches. The unsupported length is usually taken as the clear distance between floors. It should be noted that in designing reinforced concrete columns, only the area of concrete with-



No. 4—Might as well go gunning for bear with bird shot as to attempt a big concrete job without plenty of equipment. Note the self-dumping apparatus on the second elevator

offer more resistance to slipping in the concrete. Oblong bars, or "flats," are not so desirable as regular bars, and those in which one dimension is more than twice as great as the other should never be used.

Spacing of Reinforcement

The strength of reinforced concrete depends largely on the arrangement and location of the reinforcing steel. A comparatively slight displacement of the steel before the concrete is poured may reduce the strength of the member to an extent that will render it unsafe. There

members must be torn out and properly replaced.

In fireproof construction, columns and girders should have at least two inches of concrete between the metal and the outside surfaces. Beams and walls should have at least 1½ inches, and floor slabs 1 inch of protection. In non-fireproof construction these thicknesses may be reduced ½-inch. Steel for footings should have a minimum protection of 4 inches of concrete to prevent rust.

The cross sectional area of reinforced concrete columns should not be less than 64 square inches. Thus in the case of

in the steel is usually considered as effective area. The outer concrete is counted merely as fireproofing. Thus, a concrete column which finishes 12 inches on the face is figured as having an effective diameter of only 8 inches.

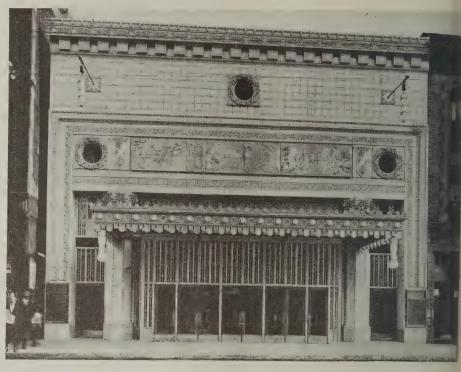
The reinforcement for columns should never be less than ½-inch in diameter and not less than four vertical rods should be used in any column. The reinforcement for vertically reinforced columns should be set truly vertical and should be secured against buckling by binding it with wire ties.

(To be continued)

Moving Picture Theatres

T HAS BEEN ESTIMATED that there are more than 25,000 moving picture theaters in this country and that an average of 6,000,000 persons attend their daily performances. Almost the entire growth of this giant among amusement devices has taken place in the short space of something like 20 years, and has in many cases exceeded the provisions that have been made for its proper housing. Ten years ago almost any sort of shelter was generally considered to be suitable for a picture house. At that time many amusement men were saying that the "movie" was at the peak of its popularity; that it was a passing novelty that would gradually decline until it passed into the obscurity from which it sprang. For this reason capital was inclined to be highly indifferent toward investments in new buildings that were designed for use solely as picture houses.

This pessimistic attitude of amusement men and the passive hostility of capital had its effect in restricting the movie to hand-me-down accommodations. The usual procedure was to rent a more or less dilapidated store room—often of frame construction—install as many seats as possible—in many cases rough wooden benches—tack a bed sheet against the rear wall, and open up for business. There was no provision for ventilation, nor for general sanitation, sometimes



No. 1—Orpheus Theater, Chicago. Aroner & Somers, Architects. Terra cotta is especially adaptable to the somewhat playful air which the details should give to a moving picture theater

none for heat; the projection machine was often stood on an open platform in the rear of the audience; and in many respects the room was as complete a fire and disease trap as could be devised. There are no means of determining how many lives have been sacrificed on account of such insanitary conditions, and that more lives have not been lost on account of fire is due to the special providence that seems to have been assigned to the "movie" from the beginning.

The fact that the "movie" has not only survived this critical stage of its development, but has actually thrived in spite of it, points to still greater growth in the future. Amusement men and investors have come to realize that the "movie" has come to stay, and it is a matter of only a few years until every community in this country will replace its hand-me-down picture houses with tailor-made ones designed solely for housing this popular form of amusement.

Of course, it will sometimes be found that an existing building may be satisfactorily remodeled to meet the special requirements of a picture house, but it is usually cheaper and easier to build an entirely new building. The difficulty of adapting the ordinary building so that it will serve as a picture house, increases with its size, and, except for very small houses, the game is scarcely worth the candle.

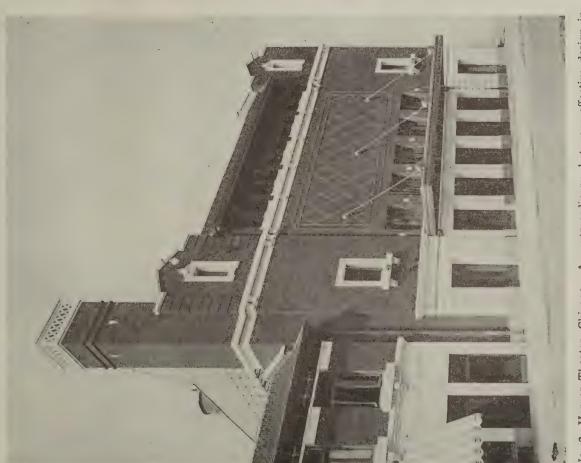
Generally speaking, a picture house should offer more attractive features to



No. 3—Moving Picture Theater, Pittsburgh. Pa. A design in straight brickwork. The detailing of the brickwork is interesting, but the building has a somewhat gloomy air for a "movie"



No. 4—Bertha Theater, Chicago. Grossman & Proskauer, Architects. A combination of brick and terra cotta. The roof treatment is a combination of metal and slate and forms an attractive treatment for the upper portion of the building



No. 2—Harper Theater. Chicago. An extraordinary, but very effective design in white terra cotta and dark brick. The detailing shows refinement and is in harmony with the building at the left

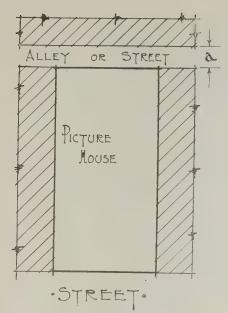


Fig. 1-"a"-Not less than 8 feet wide

the average investor than any other class of commercial building. In many cases the owner of the building also operates the picture house, but more frequently the building is leased to a "movie" exhibitor who is usually better fitted by experience to make a success of a business which, to say the least, requires an intimate knowledge of the desires of the public, in order to prove profitable.

The progressive architect and the wideawake builder will recognize the opportunity for additional business which is suggested, and will often find that their own community is dead ripe for a new picture house, and all that is necessary is for the need to be brought to the attention of a live investor.

Location

The location of a picture house is highly important. It should be located on a well lighted street that regularly serves a prosperous class of traffic. An additional value is given the location if it is also convenient to an important cross street. If it is placed near another picture house it should be so attractive and so clearly superior to its neighbor that competition will be easily overcome. A location near a popular hotel is always desirable as a large proportion of the transient public is usually seeking some sort of amusement to overcome their loneliness and boredom.

Picture houses are usually located on inside lots, as corner lots offer no particular advantage for this class of building, but do provide excellent natural locations for store buildings which require large exposed surfaces for display windows.

The lot should adjoin a street or alley at the rear so that emergency exits may open into it from the rear of the building. An additional alley at the side is also desirable for serving the side exits. In fact, some building codes provide that alleys or passageways must be provided on all sides of any building used for the exhibition of moving pictures.

The accompanying diagrams illustrate the important requirements for emergency passages to streets, but other requirements may be proscribed by the local code which, of course, must be followed. In the absence of a building code, however, the diagrams represent good practice in the arrangement of emergency passages and courts.

Fig. 1 and Fig. 2 are for houses seating less than 300 persons. Fig. 1 is for a building with an alley at the rear. Fig. 2 is for a building which has no alley and for this reason a passage to the street

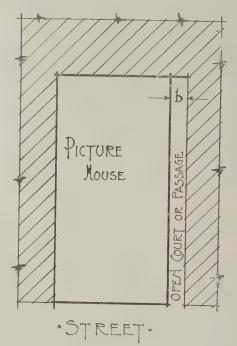


Fig. 2—"b"—6 inches wide for each 50 persons, but not less than 4 feet in any case

is required. The passage should either be built with fireproof walls, floor and ceiling or may be a fireproof court entirely open to the sky. An alley or street at the side would of course answer the same purpose. The construction of a fireproof passage may be of brick, hollow tile or concrete.

Fig. 3 and Fig. 4 illustrate requirements for picture houses seating more than 300 persons. The general requirement is that such buildings must have at least two sides facing on public thoroughfares and that the other sides must have spaces leading directly to at least one of the public thoroughfares. In Fig. 3 there is a street at the front and a street or alley at the side, the other two sides are provided with open courts. In Fig. 4 there is a street at the front and

a street or alley at the rear. This condition requires an open court along the two sides. In this case, however, it is

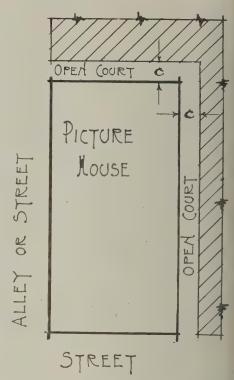


Fig. 3—"c"—5 feet wide for 600 persons or less; plus 1 foot for each additional 100 persons up to 1,000 persons; plus 1 foot for each additional 500 persons above 1,000

not considered necessary that each end of the courts open into the public spaces. Under this condition the open court usually begins at the front wall of the auditorium and runs to the alley. This allows the front portion of the building at the sides of the movie entrance to be given over to stores. If, however, there is a balcony above the stores, it will either be

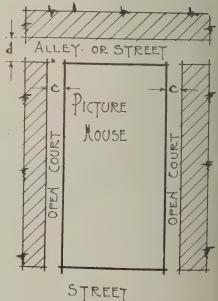
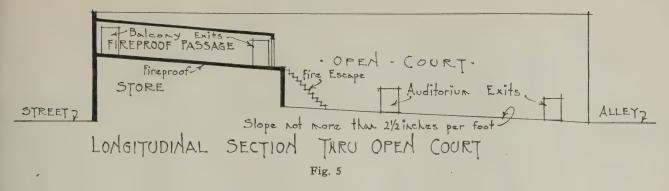


Fig. 4—"c"—The same as for Fig. 3. "d"—Not less than 10 feet wide



necessary to continue the open court along the entire length of the building or provide fireproof passages over the roof of the stores, as shown in Fig. 5. In either Fig. 3 or Fig. 4, if there were a level platform extending at least four feet between the end of the passage and the top of the fire escape. A later article will take up other features of moving picture house construction and design.

Roofy Bldg. Wall Radiator Recess CROSS SECTION THRU FIREPROOF PASSAGE

Fig. 6—"e"—Not less than 4 inches thick.
"f"—Not less than 8 inches thick

a street or alley on three sides of the building, the open court could be replaced by a fireproof passage if desired.

The slope of the floor of a fireproof passage or an open court should never exceed 21/2 inches per foot of run; should be free from steps or other obstructions, and should be 'leveled off at the sills of exit doors. Fireproof passages and their supports should always be built entirely of fireproof materials. No portion of such passage should be less than four inches in thickness and all radiators, etc., should be recessed in the walls. Door jambs of such passages should not project more than six inches from the walls at any point. Fig. 6 covers other points regarding fireproof passages. In a passage similar to the one shown in Fig. 5, there should be

Gateway for a Street Entrance



An inviting approach

THAT FIRST IMPRESSIONS are highly important is not merely a somewhat overworked phrase, but has a real application to their business, is recognized by many of the leading builders who build houses to sell. The average buyer is more or less ignorant of just what he wants in the way of a house, but if his first impressions of a house and its surroundings are pleasing ones, it is usually easy to close a deal. This is true of even those cases in which some features of the plan or location do not exactly suit him.

The accompanying photograph shows an example of the entrance to a subdivision of homes. It is a simple and dignified treatment that seems to give the street an air of privacy and distinction. The builder, no doubt, realized that many people desire just this sort of atmosphere around their home and that some sales would be effected on this account.

In the present case the entrance is composed of four simple piers. They are faced with coursed rubble-stone and have stucco panels with brick borders. The large piers nearest the roadway have ornamental electric lanterns on two sides.

BUILDING

Building is one of the most noble professions in the world. You are doing something useful—vital—for the world when you build good, honest, permanently substantial, architecturally attractive, really useful buildings.

ON THE JOB

On the job is a mighty good slogan for any builder. Get that reputation, contractors, and act up to it.

Modern Homes

Here are Twelve Homes the Design of Which Can be Adapted to Your Favorite Plan.
They Have Been Collected from Various Sources, but Their Plans are not
Available. Their Presentation Here Enables the Builder to Formulate His
Ideas of the Style of Home That Will Meet His Clients' Tastes



Plate 1



Plate 2



Plate 3



Plate 4

No. 1—Stained woodwork with white trim seems to go with this modern style of house. The soffit of the overhang is painted white to reflect light into the second-story rooms. Note the recessed entrance and its hood.

No. 2—A house of the bungalow type with stained, shingled walls and white

trim. The circular piers which support the small roof at the entrance are a novelty. They are built of a combination of small field stones and red brick.

No. 3—A brick veneered house with the upper portion of stained shingles. A simple but very effective treatment that requires very little expense for upkeep. The shrubbery and vines overcome any tendency toward a blank appearance in the lower wall.

No. 4—Brick on hollow tile is used for this Western type of house. The trimmings are of white cement stone and the roof is of asphalt shingles. This house may be called fireproof in so far as exterior fires are concerned.



Plate 5



Plate 6



Plate 7



Plate 8



Plate 9



Plate 10

No. 5—The details of this house are somewhat English in character. The walls and trim are of painted woodwork and the foundation, chimneys and parapet of the porch are of brickwork. The

dormers are a trifle heavy in design.

No. 6—Another house that is somewhat English in its design. The base is of brick; the lower wall of rough cast stucco on metal lath, with stained half-

timberwork, and the upper portion of the wall is of stained shingles.

No. 7—The design of this house is derived from the Colonial. The walls are of wide siding, painted white, and





Plate 11

the shutters are a bluish green. The recessed entrance and the flower boxes are attractive, but the dormers are too heavy in appearance.

No. 8—A very simple type of house that is highly popular. The foundation is of concrete blocks; the walls are of narrow siding, painted white, and the dormer is of stained shingles that blend with the roof surface.

No. 9—A house in the Western style, so called from the fact that it originated

in the Mid-West. This style is characterized by an absence of shaped mouldings, by the wide overhang of the eaves and the horizontal feeling that is given to its masses.

No. 10—This house is very similar to No. 9, but a comparison will reveal several differences. The wide clapboards are rough-sawed and stained; the upper wall surface is of stucco on metal lath. Note the wide flower box under the living porch windows.

Plate 12

No. 11—A brick house with an interesting surface obtained by using a double stretcher and leader bond. The entrance is recessed and has a cement hood and brackets. By inserting storm-sash, the recess becomes a vestibule in cold weather.

No. 12—This bungalow is built of a type of hollow tile which has a brick finished face. The units are 5x12 inches on the face and lay up very rapidly. The roof is of asphalt shingles and the dormer is finished to match.



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Far out on the plains of British South Africa the natives build homes of the character shown in this illustration. The building at the left is the most popular. If the native can get food the whole problem of making a living is solved. He pays no rent and wears hardly any clothes. His wants are as small as his life.

A Beautiful and Comfortable Home

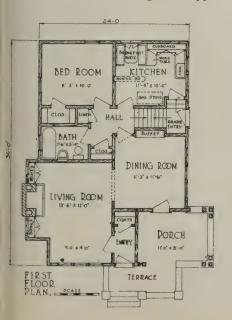
THAT IT TAKES a large amount of money to build a house—a beautiful and comfortable home—is commonly supposed. The small house can be as beautiful, and, as is very often the case, more comfortable than the larger dwelling. Beauty need not be sacrificed for

The story-and-a-half bungalow here illustrated, considering everything, is a style of house which proves to be a solution of all problems. Pleasant and charming in its simplicity, a house designed along such lines becomes a real home. With comparatively few furnish-



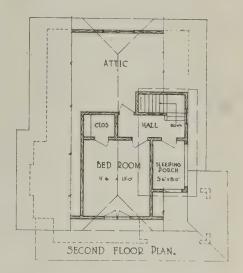
An attractive and comfortable home. Eugene R. Shulz, Architect

economy. The degree of intelligent skill lines. He should have ideas of his own. and sympathetic understanding exercised in its design and the proper use of materials in the construction, together with its fitness of purpose, makes it beautiful. No man should build along stereotyped



ings and a few flowers, this style is made to express hospitality inside and out.

The house, as planned, is approximately 24x36 feet in its main dimensions. From a small terrace one enters directly into the house. Thus the porch can be enclosed and becomes private. The coat closet in the entry is a handy convenience. The living-room, with its cheerful fireplace and bookcases, is comfortable, and there is plenty of desirable wall space for the arrangement of furniture. The dining-room is of ample size for its requirements, and from it one can pass out to the porch through a French door. From the dining-room one passes to the hall and from it to all the rooms that are private. For the family of two, the one bedroom on the first floor would be sufficient, the additional room upstairs to be used for a guest chamber. All the comforts and conveniences are provided, a linen case and an extra closet for the storage of table-leaves and what not. The kitchen is the last word in household efficiency-the folding ironing board, the handy sink, cupboard and worktable, and the cozy and practical breakfast nook; such a kitchen would gladden the housewife's heart. A grade



entrance serves as a direct passage to the basement and as a service entry. The plan of the second story is simple, the bedroom, sleeping porch and attic opening to the hall. A study of the plans and perspective sketch will prove this to be a practical solution of the small home—a compact and economical house to build.

UNEVEN COATINGS ON WOOD CAUSE WARPING

Coatings of equal moisture resistance should be applied to all surfaces of a wood product which would give dissatisfaction if it were to warp in service. Tests at the Forest Products Laboratory, Madison, Wis., have shown that even when wood is properly kiln dried no coating entirely prevents it from picking up or giving off moisture and, consequently, from swelling and shrinking under the influence of varying atmospheric conditions. Varnish, shellac, and other moisture-resistant finishes, merely decrease the rate at which the moisture changes in wood occur. The higher the grade and the more coats applied, the slower will be the moisture changes.

Unequal coatings on opposite surfaces of a wooden article cause unequal rates of change in moisture content and hence unequal shrinkage on the two sides of the piece. The result is that the wood tends to cup or twist out of shape.

GO AFTER YOUR SHARE

The high rents and the shortage of houses not only make a market for the builder, but newspapers and magazines are full of illustrations of houses, stimulating the desire of the renter to become a home-owner. Do a little hustling yourself, Mr. Builder, and advertise to let the public know you can supply these needs.

The Group House

T is only lately that Americans have been willing to give the group house a hearing. We have so long been accustomed to living in detached or single houses that they had become a part need for houses was so great that most people would lay aside their natural prejudices and would rent or buy anything that offered adequate shelter. These architects and builders also felt the friendly reception which the group house is receiving. People who have been accustomed to living in apartment houses together with anywhere from two to a hundred or more other families are





Two-family houses

of our national life, and until recently we were prejudiced against any suggestion of housing neighboring families under the same roof. We seemed to take the position that such manners of living were somewhat degrading, and that by an adoption of the plan we would suffer an infringement of our liberties. This attitude was true not only of the householder, but was apparently shared by the architect and the builder. He was indeed a brave man who ventured to suggest to a client that the group house had any advantages over the customary detached type.

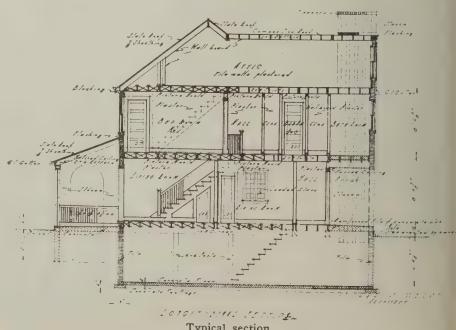
Many of us were, of course, more or less acquainted with the fact that the group house has been successfully used abroad for many generations, and that in those countries there was no sentiment against the type, but we in America were slow to recognize its advantages, and until lately it had but few friends in this country.

The growing tendency in favor of the group house began to assert itself shortly after the beginning of construction on our huge industrial housing developments. Industrial housing needs were at that time so important that every effort was directed toward an attempt to conserve the time, labor and material required for the erection of houses Many architects and builders had long recognized the fact that the group house fitted these conditions exactly and that here was an opportunity to introduce the type on a large scale. They felt that the

that once the average family became acquainted with the group house, many of their prejudices against it would disappear. They knew also that a large number of the workers were foreigners, many of whom had been accustomed to this type of house in their native land, and that these people could be depended on to accept the group house without question.

The phenomenal growth of the apartment house idea in this country also probably assisted in paving the way for not apt to object to similar conditions in the group house. In fact, many people have learned to prefer having neighbors under the same roof. This is especially true of families in which the men folk must be away from home a large part of the time.

To say that the group house has received a uniformly friendly welcome throughout the country would be untrue, but the exceptions are rare, and it is fairly safe to assume that its popularity will increase rather than subside



Typical section



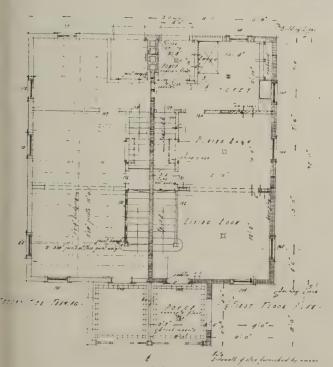


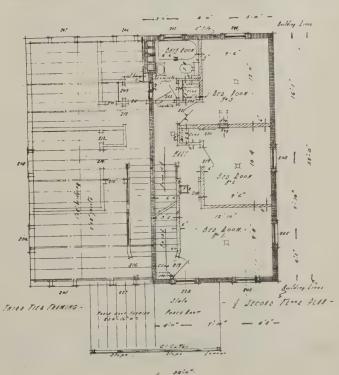
Two-family houses





Two-family houses





Typical two-family house plan

and that more of this type will be built every year.

The group house has several advantages over the more common detached, or single house. First, it is cheaper, as one of its walls serves two houses. For the same reason, less ground space is required; it may be built in less time; requires less material, and the cost of upkeep is less than for detached houses. Group houses are also easier to heat, which results in economy in heating

equipment and in fuel. One chimney in the party wall is usually sufficient, and single plumbing lines may usually be run to serve two dwellings. The total first saving usually amounts to between \$300 and \$400 for houses with masonry walls.

From a standpoint of "looks" the group house offers far greater possibilities than do small detached houses. The pill-box effect of the latter is almost always noticeable, but where sev-

Typical wall section

eral houses are combined under one root this feeling disappears. Experienced de signers have always realized this advantage of the group house.

In designing group houses to compet with detached houses, all of the above points must be considered. If the house involves joint ownership between two o more persons; that is, one person owning say one-half and another person owning the remainder, further considerations are usually required. In this case every ef fort should be made to reduce the pos sibility of friction between the join owners. The exterior walls, roofs, and so forth, should be constructed of dur able materials which require little or no attention to maintain a neat appearance For this reason it is wise to avoid painted surfaces on the exterior whenever prac ticable, as they require refinishing every four or five years, and one owner's idea of the proper time or color to paint his portion of the house might not coincide with that of his neighbor.

The construction should also be as nearly fireproof as is practicable, as the fire hazard is multiplied by an amoun which almost equals the number o families living under the same roof. In any case the party wall between two dwellings should always be built of fireresisting materials, extending withou openings, from the basement to the under side of the roof. This wall forms a fire stop and also reduces the communication of sound between the different dwellings Hollow tile makes a fairly light construction that is efficient in these re spects and is commonly used for this purpose.

The illustrations which accompany this story represent a community of group houses that is located in Bethlehem, Pa The architect was George S. Welsh, and the houses were built by the Dodsor Realty Corporation. Both the architect and the builders have had a large amount of experience in the design and construction of industrial housing developments and their work may be said to embody most of the good points which govern house building on a large scale.

Bethlehem was one of the first of our towns to feel a shortage of industrial homes. The local steel mills were among the first industries to engage in munition work and the sudden expansion of their working force taxed housing facilities to the utmost. The Dodson Corporation early recognized the advantages of the group house for developments in which speed and economy were necessary, and laid out and built this community of houses, a large majority of which are of the group type.

The development is known as Elmwood Park. The plot was laid out with sewers, public service lines, street lighting, paving, sidewalks and everything



Rear view. Two-family



Single-family house



A six-family home



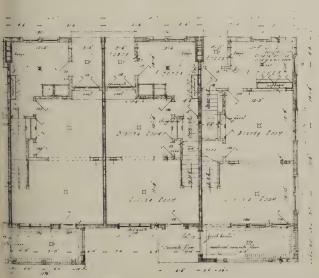
A winding drive gives advantages

reessary to form a modern home comnunity. There are some 68 dwellings in the development and in most cases from to to six dwellings are grouped under the roof. Each dwelling is modern in the roof. Each bathtom has three fixtures and the kitchens the provided with combination sinks and lundry tubs, and combination gas and coal ranges were installed by the builders, but if the buyer does not desire these, their cost is deducted from the selling price.

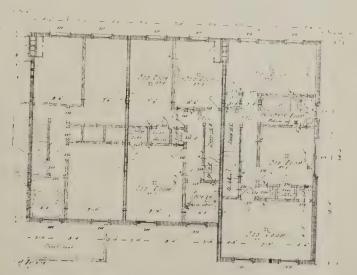
The dwellings range in size from six to eight rooms; dwellings smaller than these not being in much demand. Six rooms give a living-room, dining-room and kitchen on the first floor, with three bedrooms on the second. This size pro-

vides one bedroom for the parents and separate ones for the children of each sex. Four-room dwellings are common in some developments, but in this respect it has been noted that people usually demand more rooms in a home of their own than they will require in a rented house.

Most of these houses have tile exterior walls above grade and vitrified tile foun-



E FIRST FLOOR PLEASE



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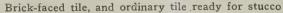
Typical six-family house plans

dations. The porches have a combination tile and reinforced concrete slab. The exterior tile was either stuccoed or was built of special tile which has a brick face on the exposed side. A few frame houses were built, but even in these the common dividing wall is of tile. Secondstory rooms which project over porches below have floors insulated with insulating quilt to keep out the cold air. The pitched roofs are covered with asphalt shingles, and asphalt roofing was used on the roofs and decks. The bath-

and would sometimes simplify the heating. The dining-room is provided with a built-in china cabinet which is flush with the finished wall and projects into the space between the main stair and the one to the basement. The bottom of the cabinet is raised so that it does not interfere with the headroom of the basement stair. There is also a large coat closet in the space between the stairs. The kitchen is somewhat irregular in shape and is well arranged. It has cross lighting and ventilation and

In the interior dwellings of the six family type, the dining-rooms have no exterior wall, but are lighted through the wide arched opening and by the case ment windows opening onto the reapporches. A built-in seat is provided be neath these casements. In all other essential respects the first floor of an interior dwelling is like that of an end dwelling, but of course none of the rooms have cross lighting and ventilation. One of the bedrooms is but seven feet wide in the clear; this forms a very undesir







These houses are built to wear well

rooms are floored with composition flooring with integral, coved base six inches high. The basement windows have metal frames and underground garbage receivers were installed near the rear entrances. The attic space and the closets are finished with wall board.

The combination of an ordinary gable roof with a gambrel roof over these houses is a clever idea. The gabled roof across the front makes a good appearance and partly masks the lines of the gambrel roof, which, although somewhat ugly, allows a large attic space. This is clearly shown by the rear view of one of the houses and by the typical section.

The accompanying plans show the arrangement of typical six-room group houses of the two-family and the six-family types

The two-family plan is 32 feet square, which gives each dwelling a width of 16 feet. Within this limited space the architect has provided six rooms, a bath and a rear porch. The party wall contains one chimney, which serves both dwellings, and the bathrooms are placed back-to-back and line up with the kitchen plumbing. The entrance leads directly into the living-room, at one side of which is the stair to the second floor. The living-room has cross lighting and ventilation and there is a small closet under the stair. The wide opening between the living-room and the dining-room gives these rooms the appearance of one large room. If found desirable, this opening could be fitted with French doors which would give more privacy

contains a built-in cabinet. It is convenient to the basement stairs and to the rear porch.

The second floor contains the three bedrooms, each of which has a closet. The placing of the attic stair in the front bedroom closet is a novel idea. There is a small linen closet in the bathroom. The front bedroom has cross lighting and ventilation and so does the rear bedroom of most of the houses, although only one window is indicated for this room on the plan.

In the six-family plan the dwellings are also 16 feet wide by 32 feet deep and contain six rooms. The plumbing of this house is widely scattered and only the two middle dwellings have bathrooms back-to-back. In the end house the first floor is almost the same as in the two-family house, but a couple of feet have been taken from the livingroom and added to the dining-room. The main stair has been pushed back and the basement stair space has been enlarged so that there is room for a row of shelves beside the china cabinet projection. The kitchen remains the same, with the exception of a rearrangement of the equipment. The most important feature of the second floor arrangement for the end house is that the front bedroom projects over the porch below, thus adding materially to the area of the floor. The front and rear bedrooms of this dwelling are quite large, but are faulty in that cross ventilation is not provided. The attic stair and the linen closet are accessible directly from the hall.

able room for sleeping purposes. A second floor arrangement similar to that of the two-family house is to be preferred

ENTRANCES

OLD NEW ENGLAND DOORWAYS, b Albert G. Robinson; 21 pages of text an 65 full-page plates, all 7x10 inches. Put lished, 1919, by Chas. Scribner's Sons, Ne York. Cloth, \$3.00 net. Those readers of NATIONAL BUILDE.

who find interest in the pages devoted to "Entrances" should derive considerable pleasure and profit from "Old New England Doorways." The book is clearly designed for the general reader, but professional designers will find its content well worth while.

The text offers a short discussion of the author's impressions regarding of Colonial work and workers, but does not refer specifically to any of the plate. The photographs which are reproduce on its plates represent much searchin by the author for worth while example of little known Colonial work, and i many cases the subjects are original if that they are here published for the first time.

This originality should make the boo valuable as a reference work, but in common with almost all books of this type it relies entirely on photographs for it examples, which, although excellent it themselves, do not cover the groun necessary for the clear interpretation of detail upon which much of the success of Colonial work is based. If the photographs were supplemented by lindrawings showing sections and moldin contours, this class of books would fin a more ready sale among designers.

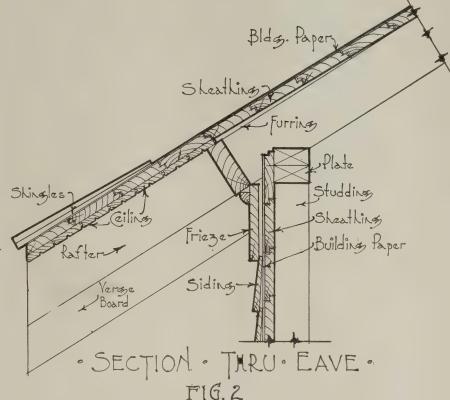
Practical Details of Construction

By I. P. Hicks

A NEW METHOD of making a box sill is shown herewith in Fig. 1. It is called a T sill and consists of a 2 by 8 and a 2 by 4 laid flat on the wall and spiked together with joints well broken. A timber the same size as the joists is stood on edge and spiked on; leaving a good bearing on the inside for the floor joists which are to be well nailed through the upstanding member of the sill, thus tieing the whole framework together in a very substantial manner.

In sheathing the outside wall, start the sheathing about three-fourths of an inch above the foundation wall. This leaves a little space that can afterward be painted with mortar, making an airtight job.

Sills of any type should always be bedded in mortar and secured to the foundation wall by means of anchor bolts. The mortar bed forms a tight joint between the sill and the masonry and prevents cold air from blowing into the basement and under the floor. Anchor bolts may be \%-inch bolts two feet long set at 5-foot intervals and built



Siding Sheathing Bldg, Paper

Water Table Joist Sill

Pointing Mortar Bed

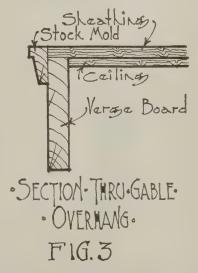
Anchor Bolt D Foundation

FIG.1

SECTION TURU SILL

into the masonry. They insure the house against shifting on the foundation during heavy winds.

Figure 2 shows how to construct a tight bungalow cornice. One of the ob-



jections to the bungalow cornice is the difficulty of getting a tight job where the frieze is ordinarily notched around the rafters. A poor job fitting around the rafters always results în letting in much cold around the cornice. The raft-

ers should be cut to fit over the sheathing, then take timber of the same dimensions as the rafters and cut in between the rafters, as shown. If a frieze is used, cut it in, so that the top edge comes up snug under the rafter ends. Then cut the bed mold under, as shown, and you have practically an air-tight job that is simple to execute. If you wish to economize a little, you can leave the frieze off, side right up to the rafters and run a small mold just under the rafters. Either way makes a tight job.

The cornice ceiling is put on top of the rafters and the roof sheathing over the ceiling as shown. In sketch No. 2

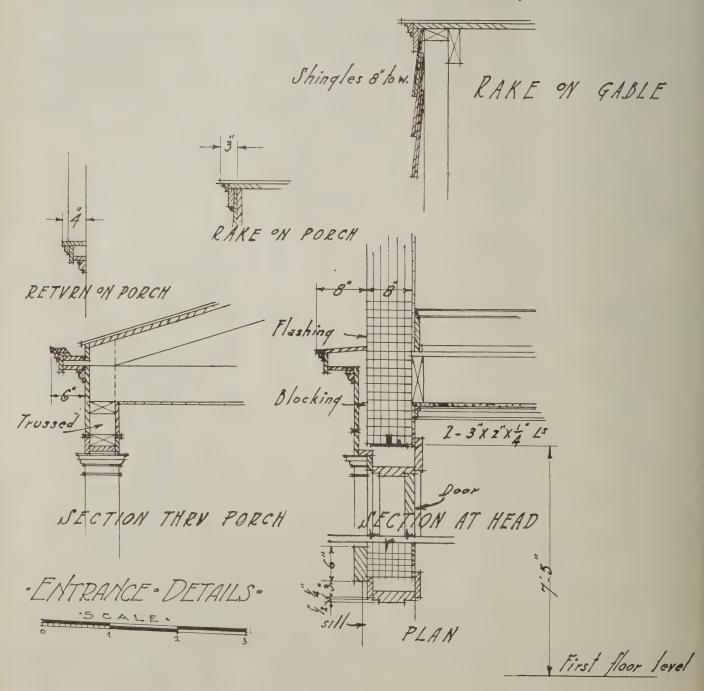
the furring is tapered down to a feather edge. The taper can be readily made with a few pieces of lath and shingles, tapering it down so gradually that no variations in the roof surface will be noticeable. In sketch No. 3 the cornice ceiling up the gables is nailed directly to the under side of the sheathing. This makes a much stronger job than nailing short pieces of ceiling to the end rafter and to the verge board the way it is usually done. Where the ceiling was nailed only to the end rafter and to the verge board wind storms have been known to tear the gable cornice completely off.

Another advantage of this method is

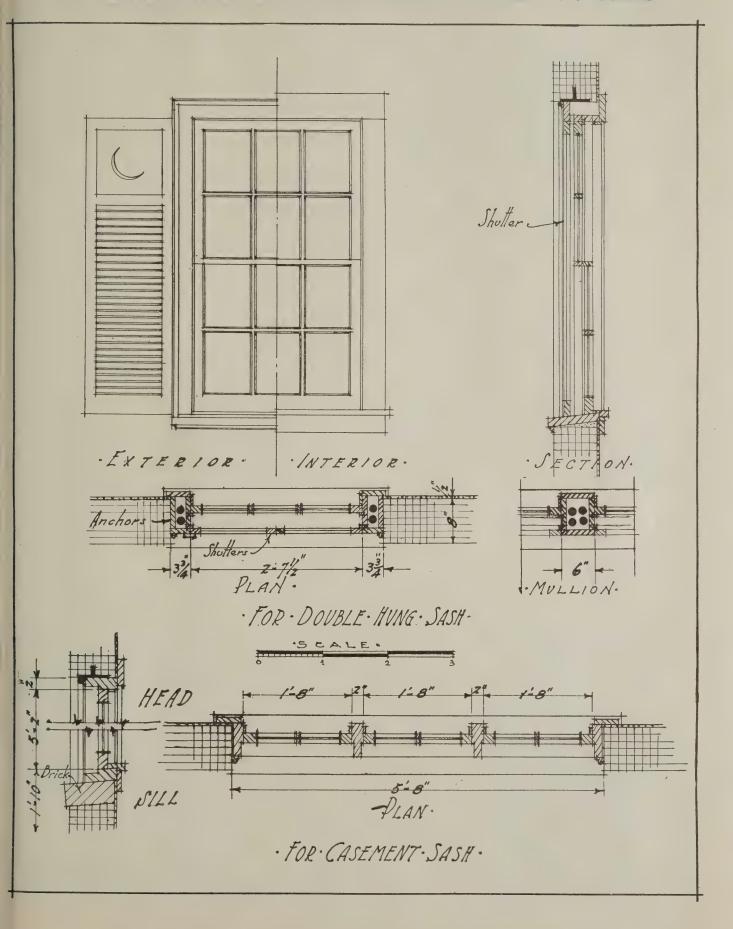
that the regular length of shingle nail may be used in shingling without any danger of their showing through the cornice on the under side. The short nails as used in the usual method do not half hold the shingles and almost always result in an unsatisfactory job.

The sketch No. 2 shows a 2 by 6 rafter, the verge board being 2 by 10. For a gable mold use the stock watertable; it is wide enough to cover the ceiling and sheathing ends and makes a good finish for the gable besides being much better to shingle to than is the crown mold, which is usually used at this point.

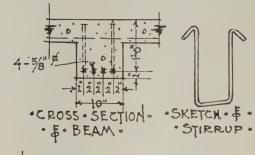
ENTRANCE DETAILS-Geo. S. Welsh, Architect

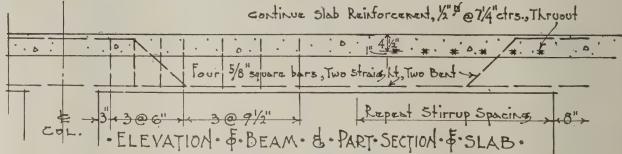


Windows in Hollow-Tile Walls



Concrete Beam and Slab Design





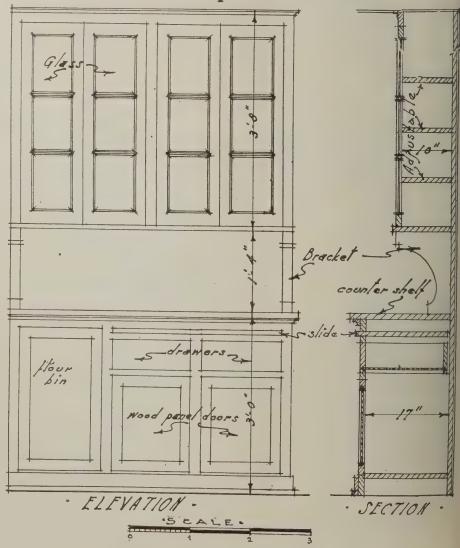
A CORRESPONDENT, A. M., asks for the design of a reinforced concrete beam on a 10-foot span, to support a reinforced concrete floor slab; the slab to have a span of 11 feet and to carry a live load of 100 pounds per square foot.

As shown by the accompanying drawing, the slab should be 5½ inches thick, including fireproofing, and should be reinforced with ½-inch square bars spaced on 7½-inch centers. Every other bar should be bent up over the support. The bend for the slab bars should begin about 2 feet 3 inches from the support. The slab should also have ¼-inch round or square temperature bars laid at right angles to the reinforcement. Temperature bars are usually spaced about 20 inches on centers.

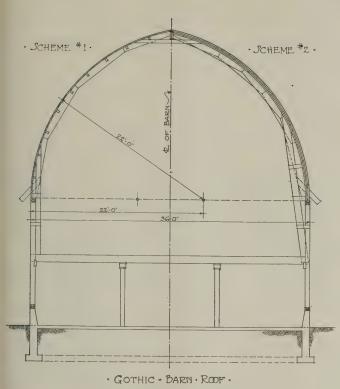
The beam should be 12 inches deep, including fireproofing, and should be 10 inches broad. The beam reinforcement is composed of four 5%-inch square bars, two of which are straight and two of which are bent up over the support. The bend for the beam bars should begin about 2 feet from the face of the support. This beam must resist considerable shearing stresses, so it will be necessary to use stirrups. The stirrups are made of 3/8-inch rods and have a hook bent down into the concrete at the top. Fourteen of them are required for each beam and they should be securely wired to the main reinforcing wherever they cross it.

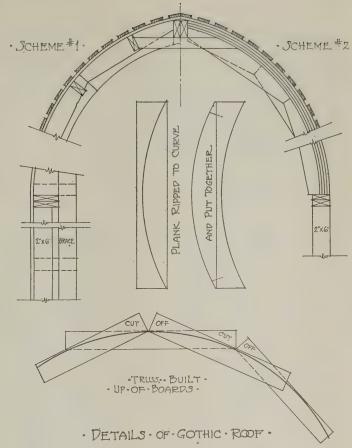
The slab must be cast at the same time as the beam, otherwise they will not act together, and a larger beam must be used.

Kitchen Cupboard Details



Gothic Roof Barn Details





H. L. & Co. ask for information about the construction of the rafters used for Gothic roof barns.

The trusses are usually built-up of three layers of 2-inch plank and are spaced 6 or 8 feet on centers. The radius of the curved portion is usually taken at three-fifths of the width of the barn.

Scheme 1 shows a method in which

2 by 4 purlins are cut in between the trusses for the purpose of supporting the roof boards. These purlins are spaced at 3-foot centers and are set with the top edge about one inch below the crown of the trusses. Then 1 by 4 sub-rafters are spaced at 2-foot centers between the trusses and nailed to the purlins. Shingle strips are then nailed to the trusses and

to the sub-rafters in the usual manner.

Scheme 2 shows a method in which the sub-rafters are built-up of four layers of 1 by 4. The sub-rafters are formed by bending them to shape around the crown of a truss, and securely nailing each layer together. These sub-rafters are then spaced at 3-foot centers between the

LEAKS

T would be interesting to know just how many big failures have been due to little leaks. With competition so



Busting things

keen as it is in the building game, the margin between profit and loss is often so narrow that if the leaks are ignored the profits may be entirely wiped out, and, in fact, may give place to a loss.

Leaks that cost a few cents here and a few cents there soon amount to a dollar. With a few larger leaks thrown in for good measure, the dollars may grow to hundreds. Then it is usually only a short while until the sheriff is knocking down the assets to the highest bidder, and the builder who ignored the leaks is wondering how it all happened.

Of course, every experienced builder adds a certain amount to his bids to take care of the overhead, but suppose this allowance is eaten up by an error in taking off the quantities or by an unexpected rise in the price of materials, and nothing is left for the job-overhead? Then, if the builder goes in the hole he will probably lay his loss to one of these causes, instead of tracing it to the minor

leaks, which were more or less responsible for putting the job in debt.



Making Double Work

The accompanying photographs illustrate a couple of leaks which occurred within ten minutes of one another. A builder who can study them and then say that they are of no consequence and are merely to be expected, had better hustle out to his own job and see what is going on. He will probably find that his men have adopted his own attitude and make no effort to avoid leaks, and if he will carefully check up the dollars and cents loss which one day's carelessness is costing, he will probably receive an eye-opener regarding the cost of leaks.

Fig. 1 shows an ordinary trestle that has broken down under a heavy load of 3x14s. The reason given for piling the lumber on the trestle was that the trestle raised the pile off of the ground. The fact that the workman thought of protecting the lower boards from damage is an evidence of good training, but he used poor judgment in selecting the means for accomplishing his ends. There were a half-dozen short pieces of timber lying around, any one of which would have answered this purpose, and their use would have saved the trestle. Even though the trestle had not broken under the load, its use was poor policy. There is usually a shortage of trestles on a job and their use should be confined to the purposes for which they are really intended.

With a dollar-an-hour scale for carpenters, in some localities, the cost for the repair of this trestle may easily amount to more than a dollar. The center bar, two of the legs and a brace are broken, and the carpenter will use up considerable time in collecting tools, lumber and nails, and in again getting started on his regular work.

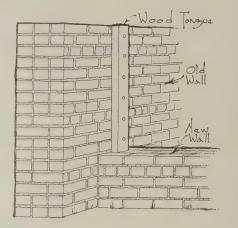
Fig. 2 shows an example of misdirected effort. The workman had originally formed a pile of a dozen or so boards in the location indicated by the board which still remains in the foreground. The foreman was standing within 10 feet of him at the time. Just as the pile was completed the foreman woke up to the fact that this space should be kept clear, and he directed that the pile be moved to the side. The 72-cents-an-hour workman is carrying out his foreman's tardy instructions. This leak is, of course, a very minor one, but remember that a large number of small holes will sometimes empty a vessel much more rapidly than one big one will.

A CORRECTION

On page 17, October issue of NATIONAL BUILDER a sentence reads, "Seats are usually placed about twenty-eight inches apart." The latter portion of the sentence should read two feet and eight inches apart.

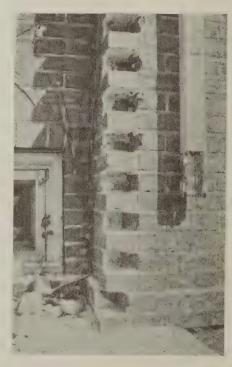
Joining New Brickwork to Old

A SUBSCRIBER, L. V. W., asks for methods of joining a new brick wall to an old one. Fig. 1 shows a method that is in common use for ordinary light construction. It is, of course, only a



A 2x4 tongue

makeshift, and its efficiency depends largely on the durability of the member which forms the tongue.



Toothing for continuation of wall

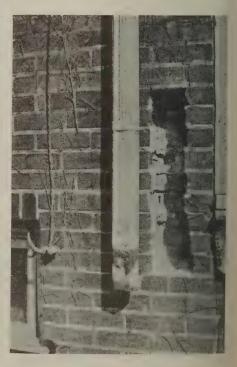
In Fig. 1 the tongue is made of a 2x4, which is nailed to the old brick wall through each alternate brick joint. If the wooden tongue were creosoted and attached to the old wall with expansion bolts it should prove quite durable. A tongue made of 4-inch steel channel, painted, and secured to the wall with expansion bolts, would be more expensive, but it would also be more de-

pendable. In any case the tongue should be set perfectly plumb and true and should register with an interior line of brick. A similar method can be used for joining the ends of old and new walls.

For first-class work, one of the methods shown in the photographs should be employed. These show what is known as toothed work, which is considered to form a durable type of construction. If toothed work is carefully done, it is difficult for one to tell where a junction has been made between old and new work. In the photographs, the object shown beside the toothing is a rainwater leader that will be removed. In toothed work, cement mortar should always be used for the new work, as it shrinks less than ordinary mortar does and therefore makes a stronger and better appearing job.

The photographs clearly indicate the appearance of an old wall that has been made ready for the attachment of new work. Bricks in the new wall will be inserted into the open spaces, thus tying the two walls together. The appearance of the finished work depends largely on the care which is used in clipping out the old bricks exposed. Bricks that are to have only a portion removed should be grooved on the face with a sharp coldchisel so that they will break with clean, sharp edges.

Fig. 2 shows the method of toothing where the finished face of the new work is to be flush with the face of the old—



Toothing for attaching at right angles

in other words, where a wall is to be extended. A similar method is used for joining the ends of old and new walls, but in such cases the toothing should run entirely through the wall.

Fig. 3 shows the method of toothing where the end of a new wall is to be attached to the face of an old one. In

such cases the groove in the old wall is often cut continuously from the top to the bottom, but sometimes, as in the present example, only a portion of the bricks are removed. A groove one-half brick wide and a couple of feet long is made, then, after a skip of a couple of feet, another groove is formed, and so on.

Special Concrete Blocks



Sometimes it is desired to make a few solid concrete blocks for a special purpose. In such a case home-made wooden forms are often suitable. The ones shown in the illustration are merely small boxes set on a loose plank

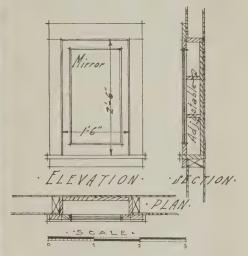
which forms the bottom. It would be well to oil the inside surface of the form before the concrete is placed in it, so that when the block begins to harden the concrete will not stick to the sides of the box.

A Hand "Dolly"



The accompanying photograph shows a hand "dolly" that is used by Mills & Son, builders, of Chicago, Illinois. It is considered a very useful part of their equipment on work where a number of houses are being constructed in one operation. With its aid lumber, tools and other supplies may be quickly and easily moved from one place to another along the concrete sidewalk. The front wheels are mounted on an axle while the rear ones are pivoted-somewhat on the order of the castors used on furnitureso that the "dolly" may be easily guided. The bed is covered with sheet iron to make it more durable.

MEDICINE CABINET DETAILS



THE HIGH COST OF BUILDING PIECEMEAL

WHETHER a saving of \$20,000 in cost of construction is a paying investment depends upon how long it will be before the entire building is needed. In other words, if a building be partly erected, with provision for future extension upwards, and the upper portion be later put on at a total cost for the entire building of \$195,000, as compared with \$175,000 estimated cost for the building erected all at once, it may be that the process of building in installments is the better policy. The whole question hinges on how long it will be after the first section is erected before the second section is needed, and whether the carrying charges of the second section added at the time the first section is built will be greater than the saving, due to construction all at once.

In the case of a building 400 ft. long, 60 ft. wide and four stories high, for which estimates have been made by the Alberthaw Construction Company, Boston, Mass., this question of building in two installments, as compared with building it all at once, has come up. The estimated cost of two stories, erected with provision for putting two additional stories above them at a later date, figures out at about \$110,00% Of

this amount no less than \$20,000 are absorbed in the heavy footings and columns necessary to carry the four-story structure, but out of all proportion for the two stories now being erected, and in the temporary roof placed above the second story, the latter to be removed when the upper portion of the building is put up.

In a certain sense, the \$20,000 excess cost of the structure now erected has to be carried without giving any return until the building is completed. If an interval of five years elapses between the building of the two sections, the carrying charge at six per cent on this heavy substructure and the temporary roof, works out at about \$7,000 of wholly unproductive outlay. To this should be added a further item of \$20,000 difference in first cost between the \$195,000 estimated for the entire building erected in two installments and the \$175,000 estimated for the entire building erected now. This makes \$27,000 as the charge against building in two installments.

On the other hand, if we build the whole structure now we shall have to carry over that period of five years the difference between \$175,000, total cost of the structure and \$110,000 estimated

cost of the lower two stories, as mentioned above. This difference of \$65,000 taken at six per cent compound interest for five years, would show carrying charges of approximately \$22,000. It is evident from these figures that there would be a very definite saving in favor of building the whole structure now, if the period between the two halves is five years.

With a much longer period elapsing between the erection of the two sections of the building, the saving would work out in the other direction. For instance, if we take ten years as the period, the carrying charge on the extra \$65,000 due to building the two upper stories now would be about \$51,400. To offset these, the carrying charges on the \$20,000 substructure and temporary roof would be \$16,000, to which is again added the \$20,000 in first cost, making a total of \$36,000. This shows that the advantage lies with the piecemeal construction to the amount of about \$15,400.

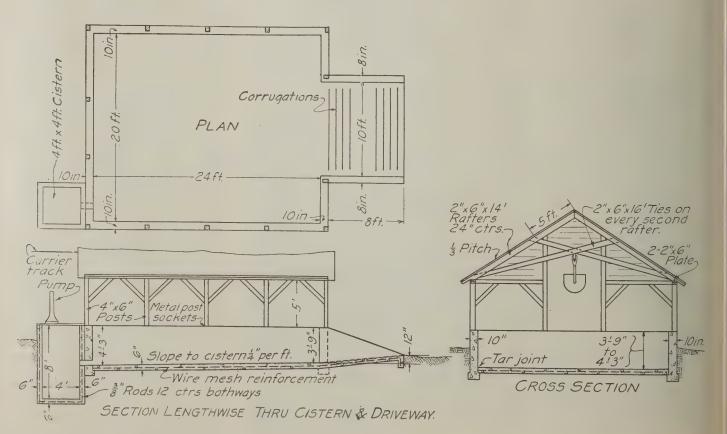
It is thus evident that only by considering how long it will be before the added floor space is necessary can the manufacturer determine, with any assurance, which method of erection will

be most advantageous to him. With industrial conditions as they are in this
country today, where the demand for
almost all manufactured products is far
ahead of the supply, resulting in high
prices, high wages and quick turnovers,
the usual answer to the question as to
whether it would pay to put up the
whole building now will be in the affirmative, because the natural growth required of manufacturing facilities will,
in most cases, be fast enough to require
the added space far inside the time limit
at which the piecemeal construction becomes the advantageous one to select.

When to this we add the fact that building the whole structure now makes it all available for use the moment added manufacturing or storage space becomes necessary, it is evident that this is one very good way of avoiding the cramped quarters which always result when demand on the plant's facilities overtake and largely exceed its capacity. If, therefore, there is any reasonble chance that further additional space will be required within five or six years, the far-seeing executive will decide that building the whole plant at once is the real solution of his problem.

Design for Covered Concrete Manure Pit

Purdue University Agricultural Experiment Station

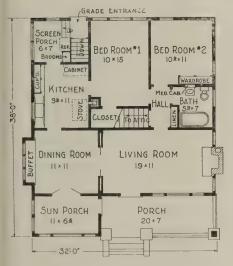


A Practical Five-Room Bungalow

By Chas. Alma Byers



A practical five-room bungalow. Designed by E. W. Stillwell, Architect



THE FIVE-ROOM HOUSE shown is a typical California bungalow in style and makes a most practical and attractive little home. Resting on a concrete foundation, its outside walls consist of narrow siding below the lower edge of the windows, and of shingles from this point upward, including the gables. There is an attractive little porch on the front, which is floored with cement. The weather-boarding below the windows, including the trimming also, is painted white; the wall shingles are simply oiled, leaving them a soft brown shade, and the roof is of gray shingles. Add to these the red brick used for the porch piers and the chimneys, and a very effective color scheme is produced.

The accompanying floor plan shows the interior arrangement and the location of a number of useful built-in features. French doors intervene between the dining-room and a small sun porch on the front, and sliding doors separate the dining-room from the living-room. The fireplace of the latter is of brick, and the buffet of the dining-room contains china cupboards, drawers, linen cabinets and a roomy counter-shelf. The interior woodwork is of pine throughout, which in the living-room, dining-room and sun porch is stained with fumed oak, and elsewhere is finished in white paint and enamel. Hardwood floors are used in the living-room and dining-room only, and the walls of these two rooms are papered, all walls being plastered.

The house has a small basement under the rear part, reached from either the rear entry porch or the outside, and there is a furnace to supply the heat. There is also a roomy storage attic which may be reached by means of an inside stairway. The house is located in Los Angeles, Calif., and was designed by E. W. Stillwell, of that city. The present building cost is estimated at from \$3,000 to \$3,500, complete.

WATERPROOFING "DON'T"

The builder on the job, a portion of which is shown in the illustration, no doubt thinks that in laying a line of field tile around the foundation wall he is providing ample insurance against a damp basement. He has, however, overlooked

one important point in that the basement wall is built so that it almost touches the earth bank. The excavation should have been dug about a foot larger all around the walls to leave room for a gravel or cinder fill between the earth and the wall. This fill would have provided a sort of porous blanket around the basement, and any water coming in contact with it would pass down through the gravel without coming in contact with the wall.

The laying of a tile drain at the bottom of a foundation is an excellent scheme, but its effectiveness is greatly impaired if no provision is made for leading the surface water to it as quickly as possible. This is especially true of dense clay soils, such as that in the present example. Clay which becomes saturated with water stays damp for a long period, and where it lies directly against a wall, the moisture is almost sure to penetrate to the basement. The fault is further aggravated in the present instance by the fact that the wall is of brick. Common brick



Waterproofing "Don't." How not to

that are exposed to dampness for long periods of time will gradually become soft and finally become worthless in so far as their strength is concerned. Vitrified brick are not subject to this danger, but are often difficult to obtain and are more expensive.

Tile drains should be porous and laid with open joints. It is considered good practice to lay strips of cheesecloth over the joints to prevent the tile from becoming clogged with sand and gravel when the back filling is being done. Tile drains should have a pitch of ¼ inch to the foot and should be led to the sewer or to a dry well. They are usually run just below the bottom of the footing.

Lengthening Life of a Shingle Roof

Experiences and Opinions by A. Ashmun Kelly, a Creosoted Stained Shingle Company, a Creosote Stain Manufacturer, and a Shingle Manufacturer

A COUNTY AGRICULTURAL roofs was entirely due to the creosote AGENT in New York State, writes to NATIONAL BUILDER: roofs was entirely due to the creosote used. While the carpenters were roof-

"Today considerable publicity is given to lengthening the life of shingles, and many advocate the use of creosote as a dip for shingles. Would you be kind enough to inform me regarding the actual increase in life of a shingle when it has been treated with creosote. In treating shingles with creosote, is the whole shingle submerged, or part of the shingle, including all exposed area? If a shingle is treated with creosote, is it true that because of the fact that the under side of the shingle has been treated, there may be more of a tendency for moisture to gather on the under side and thereby make a greater tendency for the shingle to deteriorate? With the present price of creosote, do you think that the treatment will sufficiently lengthen the life of a shingle to warrant its use? Also, about how much creosote does it require to treat a thousand shingles? I have been advised that a solution of limewater and salt will make a preservative for shingles. Do you know whether this sort of a recipe is authentic, and whether or not there is any actual preservative in the use of this

Answer by A. Ashmun Kelly

The preservation of wood by treating it with creosote is of so general a practice that it requires no defense. As to the length of time that shingles, treated with creosote, will last above the life of untreated shingles, much will of course depend. I creosoted the shingles of a barn roof that certainly retained their integrity much longer than they would if they had been left untreated. For, about the same time, or maybe a year or two afterwards, I shingled the roof of the house and did not treat the shingles at all. While the two lots of shingles were not the same, yet both lots were bought for the best heart cypress. The barn shingles always looked smooth and of good color, the stain having been slightly colored. There were no loose shingles at any time, and the roof seemed about as it was when put on, after some 18 years. The shingles on the house did not remain good very long; in a very few years the butts were standing up, many shingles were entirely loose and required repairing, this mostly on the south side. I always believed that the difference in the conditions of these two

roofs was entirely due to the creosote used. While the carpenters were roofing the barn it rained, a sort of drizzle most of the time, but it was necessary to get the roof on, to protect the stock. I did the creosoting, dipping the shingles two-thirds of their length, and scraping off the surplus stain. They were thrown into a heap, exposed to the rain, and they were taken up and put onto the roof as fast as the men could work. The rain did not seem to impair the efficiency of the creosote, but it was some job handling the shingles, wet with rain and creosote—you know how creosote stings the flesh?

I have one objection to creosoting shingles—the cost. It cost me something like \$45, I think, to do the shingles on that barn, this just for the creosote stain. I had a 40-gallon barrel of it. I forget how many shingles were used, but I know that the roofing, using one-half of the old rafters, cost \$300. It was not a large barn, either. Yet I do think the cost is fully justified by the increased life of the roof, saying nothing of the better appearance of a creosote-stained roof.

As I have stated, two-thirds of the shingle is coated, by dipping. As to moisture injuring the shingles on the under side, I would say that when a barn is in that condition, when it has so much moisture, it is lacking in ventilation, and this should be looked after. But such moisture, I think, is very rare. But even so, the creosote would preserve the shingle against it as well as against wet on the outside.

Perhaps it will interest the reader to learn what creosote is. The commercial article is known as "dead oil of coal tar," and consists of residual oil, creosote, and pitch, in solutions. This creosote has been used for many years on railroad ties and other timbers. It is too crude to be used as shingle stain, though some do thin it out with benzine, or other light oils; such creosote is greatly impaired in its preservative qualities by such thinners. If you buy a creosote stain and it has the familiar odor of benzine, reject it. Creosote stains for wood are made from a refined creosote, and it is a very light gravity oil of strong color and smell. Color is often given by the addition of japan, and if you can smell this distinctly, reject the stain; any adulteration that produces evaporation destroys the preservative value of the creosote.

Creosote shingle stain should be transparent and should not contain any water. It should be free from poisonous matter, and also no poisonous pigment should be used in it. It is almost always desired that the creosote have some coloring, and for this purpose you may use such pigments as sienna, umber, iron oxide, etc. For green, only the chemically pure are of any use, and all pigments used in creosote should be very pure and finely ground, in order to produce a mere stain, and not a painty appearance. However, all the favored shades are to be obtained in the prepared shingle stains. As a rule, they never need any thinning, but if this should be necessary, use raw linseed oil. If the stain is made too thin it will have a weak, washed-out appearance, and will the sooner lose color. Some painters add coal oil to thin it out, or to extend it. This is wrong. If used as bought the stains will dry over metal surfaces well, and yet they contain more linseed oil than paint usually does.

There are creosote stains made for interior use, and here they wear well, but would soon fade if used outdoors; this because considerable turpentine is added to the interior stains, instead of oil. It requires about 24 hours for interior creosote stains to dry hard.

And now, how to do the staining: Take the bundles of shingles and open them out; they must be dry before staining. Have the creosote stain in a half-barrel, or some such vessel, and place a strip of wood across the top, a little distance away from the side you will stand at; the purpose of this strip is to allow you to draw the shingle across it after dipping it; this removes the surplus stain. Shingles vary in length; usually you stain about ten inches of the butt end. Throw the shingles in a heap as you dip them. Rather less stain is used when you apply the stain with a brush, using the tub or vessel as in dipping. Sometimes the shingles are laid before staining, and in this case only the face of the shingles gets coated. Sometimes, too, the shingles, after dipping and in place on the roof, are given a brush coat of the stain; this makes an extra good job, but costs a good deal more. But I feel sure that it will pay to do this, too. The roof, as everybody knows, has the hardest exposures of any other part of a building; and it costs more than almost any other part, or should, while it serves

the most necessary purpose. It is worth the cost to have a good roof.

Stir the stain in the vessel now and then. Creosoting the shingles by dipping prevents warping. Mineral oils will not unite with creosote. The bare shingle will wear better than if painted. Lime water is a fire resistant, but hardly a preservative. Creosote shingle stain will prevent warping and rotting of the wood, it is proof against sun and rain, insects and bacteria. It prevents dry rot as well as wet rot. Government experts tell us that it is their opinion, founded on tests, that creosote stains prolong the life of shingles threefold. It is especially desirable where shingles are exposed to the action of salt air, as along the seacoasts. One gallon will cover about 75 square feet of shingle surface, two coats. Dipping about ten inches of the length will require from two to three gallons of the stain, for four-inch-wide shingles, to the thousand—shingles 16x4 inches.

The inquiry quoted, and Mr. Kelly's answer, were copied and sent to a firm of creosote stain manufacturers, a creosote stained shingle manufacturer, and a shingle manufacturer. Abstracts of the replies are given in the order in which they were received.

Reply of Creosote Stained Shingle Concern

The statements that we make are based upon 35 years of actual roofing by the president of this company, and it was the fact that he had studied these matters thoroughly that induced him to go into the creosote staining and color-treating of the red cedar shingle.

A wood shingle without any treatment whatever will last approximately 25 years on an average, if properly laid.

Our president brush-coated roofs in many instances, prior to his entrance into the shingle staining business about 12 years ago, and at that time he adopted the policy of securing the very best stock available of red cedar shingles, free from all knots, crimps or crossgrains, absolutely 100 per cent perfectly straight grained and absolutely "bone" dry, and, with a motive intended to produce the best possible, he decided that each shingle should be dipped individually, and this process has been followed since that time and has resulted in a very satisfactory roofing.

Some of our roofs of twelve years ago retain their color in as good shape as when originally placed upon the building.

Brushcoating gives a temporarily pretty roof, but one familiar with shingles will note that it is impossible to cover space on the underside shingle or upon the opposite side of the shingle. Stain will cover only the space to which it is applied, leaving the crevices or space between shingles without protection, causing them to rot much more readily than if they had not been treated, and our experience teaches us that brushcoating is very impractical.

Staining shingles on the ground has not proved satisfactory. A contractor or any one else can buy shingles already treated and ready to lay on the roof of a building at a much lower cost than at which he can stain them on the ground. The buyer can purchase the very best grade of red cedar shingle, 100 per cent straight vertical grained and free from all imperfections, as beautiful a shingle as man could choose, no waste, every shingle being usable, delivered in bundles all ready to carry to the roof and break open and lay, each shingle stained separately, in any color of red, brown, green or gray, stained, 12 and 14-inch, preserved full length, and the very best grade of deodorized creosote at a basic price of \$13.60.

This means economy, as well as labor saving, and the avoiding of all the mess and mussing on the property.

Mr. Kelly takes exception to \$45 for 40-gallon barrels, but admits that it did lengthen the life of the roof of his building, which justifies the increase.

If he lengthened the life of shingle with a stain at \$1.11½ a gallon, it stands to reason that if he used stain that cost him \$1.45 to \$1.85 per gallon, he would have added much more life to the shingles and greater resistance to the weather.

Whatever little complaint has been made of stained roofs has come from the fact that stain can be made for almost any price, and usually people choose the lesser price when buying.

Inferior shingle stained, if it is a straight grained shingle free from knots and crimps, will outlast a high-grade shingle unstained if properly laid.

Reply from a Manufacturer of Creosote Shingle Stains

Regarding covering capacity of creosote stain, our experience shows that on the average our stains will cover 100 square feet of shingle surface, two brush coats. We use these figures in estimating and they are almost always correct. For dipping we recommend 2½ to 2¾ gallons per thousand, dipping 2/3 the length of the shingle. This stains and creosotes the shingle up above the second course as laid, and therefore covers the part of the shingle that is at all liable to decay. The top of the shingle seldom or never decays.

Mr. Kelly is correct in stating that the cost is justified by the increased life of the roof. We have known of hundreds of cases where this has been proven and the writer can cite one that came under his own observation in Maine. A summer cottage there was covered with sap spruce shingles. This very poor shingle usually lasts only four or five years. The roof was stained with two coats of red stain and this stain applied with a brush after the roof was laid, preserving the shingles for 17 years. It was not restained during that time.

The shingles should be dipped, if possible, because dipping is a far better preservative treatment than brush coating. The latter protects only one-quarter the length of the shingle and on one side, while dipping protects it two-thirds its length on both sides and the creosote penetrates through the shingle.

It is not more economical to buy shingles already stained unless the staining is done approximately on the job. If the shingles are shipped from the mill to another point, the bundles broken and the staining done, then the shingles rebundled and shipped again to the job, you will see that the additional freight and labor must greatly increase the cost.

All of the figures show that the cheapest work is done on the job.

The same grades of shingles are used for stained shingles as for unstained, i. e., all grades are used. Some lumber dealers sell good grades of shingles, and some sell poor, and some variation will be found in stained shingles. The inferior shingle, creosote-stained, will outlast the high-grade shingle unstained.

The greatest difficulty about the inferior grade of shingle under these circumstances is that it is thin and will not protect the roof as it should. The wood shingle is the most effective insulating covering that has ever been devised for houses, with the possible exception of thatch. It covers the roof with three insulating layers of wood with air between, and when shingles of proper thickness are used, the result is surprising in the saving of fuel in winter and the exclusion of heat in summer.

Every roof that shows icicles hanging from the eaves is a demonstration that the owner of the house is melting the snow with the coal that he piles into his furnace, because the heat escapes through the roof and melts the snow.

Reply of a Shingle Manufacturer

I would say that the use of creosote would prolong the life of a flat-grained red cedar shingle at least 15 years. I do not believe that it will prolong the life of a strictly edge-grain shingle appreciably. The advantage of creosoting comes not so much through its preventing rot as through keeping the shingle in a pliable condition, which in turn prevents warping, splitting, or checking of the shingles when exposed to extremes of temperature. A strictly edgegrain shingle will always remain snug

and flat to the roof, and will not split, check, or warp, but flat-grain shingles are prone to check in extremes of temperature.

The length of the shingle to be creosoted depends upon the number of inches the shingles are laid to the weather. They should be treated at least half an inch more than double the weather exposure. This insures a treatment of creosote under all joints, so that to all intents and purposes after the roof is laid the entire roof is creosoted.

You need not worry about the use of creosote leaving moisture to collect under the shingle and contribute to a more rapid deterioration.

This is not the case. Red cedar is without a peer when it comes to a question of durability, excluding only the sap wood. Cedar trees have lain in the forest of the Northwest for hundreds of years under ideal conditions of decay and still retain every bit of their original soundness. Moss, however, should never be permitted to collect on a roof, because the little root tentacles of the moss will work into the wood and so soften it that its service is reduced.

The present price of creosote, while 700 per cent higher than before the war, is still at such a price level as to permit of great economy through its use on flat-grained shingles.

Mr. Isherwood, the Retail Service Representative of the National Lumber Manufacturers Association, states that where the entire shingle is dipped three gallons per thousand are required; where two brush treatments of creosote are given the shingles after they are laid, or where the creosote is poured right over the roof, two gallons per "square" are required.

We note that someone has recommended a solution of lime water and salt for treating shingles. This solution is all right, except for the very vital fact that it leaches out of the shingles and does not render lasting preservative qualities.

A Delivery Door-By Emma Younglove

MY FRIEND has a "Delivery Door," through which milk, meat, groceries, etc., may be delivered within the screen porch, instead of being left outside, when mistress and maid chance to be away from home at the same time. Thus the stray cat never licks the milk bottle, neither does the neighbor's dog carry off the soup bone, nor the pet horse eat the bread and suger, as happened to one family's supplies.

The delivery door is located near the screen door on the side most accessible to the delivery boys. The opening is $6\frac{1}{2}$ inches wide and $9\frac{1}{2}$ inches high. The base of the screen porch below the screen is made of beaded ceiling, matched. Outside the door is made of the same boards as the porch base, and the beads of the base are matched with those of the door.

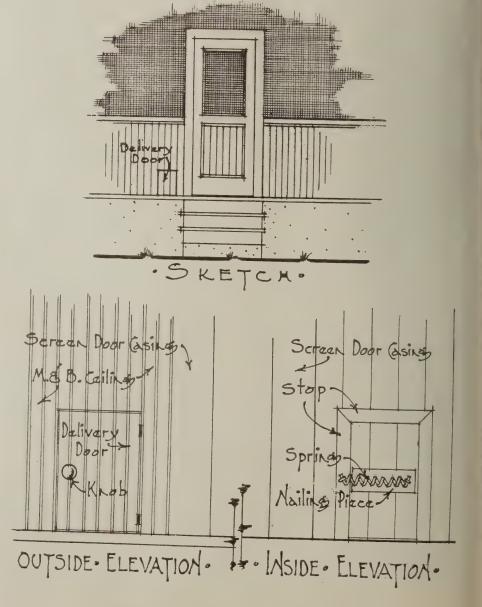
The delivery door opens out. It is hung on small, flat hinges fastened on the edge toward the screen door; and an inch in from the opposite edge is a little kettle-covered knob by which to open the door.

The separate pieces of ceiling which form the door are secret nailed to a 1/2 by 2-inch nailing piece placed on the back of the door. To keep the door closed tightly so that flies may not enter, one end of a small coiled spring is attached to this nailing piece, near the free edge of the door, and the other end of the spring is attached to the opposite stop. In some cases it may be necessary to slip a small block of wood under the center of the spring to insure its proper operation. This block will raise the center in a manner similar to the action of the bridge of a violin and will cause the spring to exert a more direct pull on the door.

About the sides and top of the opening, on the inside, is nailed a thin strip of wood three-fourths of an inch wide. It extends one-fourth of an inch over

the opening and forms a stop for the door to shut against. As the strip is mitered, it makes a neat finish within the screen porch. On the outside the

delivery door is flush with the wall, and it is not unpleasantly conspicuous, since only the neatly matched crack around it and the small knob are to be seen.



A Real Bungalow Church

By C. A. B.

THE accompanying engraving illustrates not only a real bungalow hurch, without either steeple or belfry, ut also a very practical idea. The building is located in South Pasadena, Calif., nd represents the present Christian Church edifice of that little city. Alhough used as a church today, and orignally built as such, it, however, is des-

color, while the window sashes are painted white. The front entrance porch, or terrace, is floored with white cement, with a small amount of red brickwork introduced in the low pedestals at the sides of the steps.

Referring to the arrangement of the interior, there are two front entrances—one by way of a small primary room and

Now a church, later to become a parsonage

ined to become later the church parsonige. It was expressly designed with such purpose in mind; and when sufficient funds can be raised to erect a large thurch structure on the corner lot adoining, which already belongs to the organization, it will be only necessary to tear out some of the present partitions and put in new ones, to provide the usual rooms of a small bungalow nome. No changes whatever will be necessary in respect to the exterior, unless it be decided that some of the window glass requires changing.

Except that it bears the name of a church, and that some of the windows are of the semi-opaque kind, this building has every appearance of being merely a bungalow residence of somewhat usual type. It, nevertheless, is of very attractive appearance. The comparatively flat roof is covered with a gray composition roofing and has the wide overhang characteristic of the bungalow style. The walls are surfaced outside with sawed redwood shakes, stained a rich brown

the other through a sort of vestibulethe latter giving direct access to both the Sunday-school room and the main auditorium. Folding doors are used to close off both the primary room and the Sunday-school room from the auditorium proper, and hence, for regular church services, the three rooms may be thrown into a single large one. There is the usual pulpit platform, and back of this platform, with the necessary partition walls, are two small anterooms; the toilets, a choir room and a kitchen, besides a rear entrance hall. There is another small classroom as a sort of added extension on one side.

With the exception of the main auditorium, where the ceiling follows the roof pitch in modified chapel fashion, the several subdivisions of the interior are finished with a ceiling height of eight feet, six inches in the ordinary way, and plastered. The kitchen is provided with built-in cupboards and the customary sink, and the usual plumbing connections are made for both the kitchen and the

toilets. The walls throughout are plastered and tinted, and the woodwork, which is of pine, is stained a greenish fumed-oak shade, except in the kitchen, where it is painted white.

The building was designed and built by Edward E. Sweet, architect, of Los Angeles. When erected a few years ago the cost was approximately \$1,750, which includes no facilities for heating. The building cost today, however, would probably be about \$3,000.

When only very limited funds are at the disposal of a church organization, the plan here employed will be found quite practicable. It provides a very satisfactory church edifice for temporary use, although somewhat small and unpretentious. At the same time, through the conversion of the building into a home for the pastor, there is scarcely any loss entailed when the erection of a more imposing church structure is made possible. In some localities, however, in duplicating the bungalow here illustrated, the roof would, of course, require somewhat greater pitch, to withstand weather conditions.

SCHOOL BUILDINGS

CHECKING SCHEDULE FOR PROJECTED SCHOOL BUILDINGS, by James O. Betelle, architect. 32 pages, 634 by 1034 inches. Published by The Bruce Publishing Co., Milwaukee, Wis.

A pamphlet designed to assist the architect in obtaining the information necessary for working up the plans and specifications for projected school buildings, and also designed to save the time of the school board in checking the final working drawings and the specifications.

The bulk of the text is arranged in the form of a questionnaire, which covers practically all of the general questions that are likely to arise in connection with the erection of modern school buildings, and the pamphlet should prove of value to anyone who is interested in school-house design.

TO CONSIDER PAY FOR ESTI-MATES

The Associated General Contractors of America have made preliminary arrangements for a conference with committees from the American Institute of Architects and Engineering Council to consider the subject of payment for estimates. It is planned to hold the first meeting of the conferees, November 17, at the Hotel LaSalle, Chicago. Contractors are requested to submit their suggestions to the secretary of the A. G. C.

Publications and Announcements

How to Make and Use Graphic Charts—A new book, by Allen C. Haskell, with an introduction by Richard T. Dana, describing and illustrating the uses of all kinds of charts in connection with organization and management work, cost and cost analysis, scheduling and progress, operating characteristics, results of tests and experiments, statistical trends and predictions, computation, designing and estimating, etc. 500 pages, 6x9 inches. More than 500 illustrations. Price, \$5.00 postpaid. Codex Book Co., Inc., 19 William street, New York.

Five Hundred Business Books—Compiled and annotated by Ethel Cleland, librarian, business branch of the Indianapolis Public Library, with an introduction by John Cotton Dana, librarian, Public Library, Newark, N. J. American Library Association, Washington, D. C.

Techno-Chemical Receipt Book, by Brannt and Wahl. This work aims to give an accurate and compendious collection of recipes and processes of practical application in the useful arts and industries and for general use. 516 pages, 5x7¾. Henry Carey Baird, Inc., 110 Nassau street, New York. Price, \$2.50 net.

The Concrete Builder—Concreting in Cold Weather.—No. 6, volume 2. Gives a comprehensive illustrated description of various methods of concreting in cold weather, with much valuable allied information. Portland Cement Association, Chicago.

Employment Management, Employee Representation, and Industrial Democracy.—An address by Grant Hamilton, Director General of the Working Conditions Service of the U. S. Department of Labor, before the National Association of Employment Managers, Cleveland. Government Printing Office, Washington, D. C.

Training Courses in Safety and Hygiene in the Building Trades.—Bulletin No. 31, Trade and Industrial Series No. 6. Is used by the Federal Board of Vocational Education. Government Printing Office, Washington, D. C.

The Master Woodworker.—Illustrated descriptive catalog of the Woodworker Manufacturing Co., Brush and Congress streets, Detroit, Mich.

The Orifice as a Means of Measuring the Flow of Water Through a Pipe.— The selection of the type of meter to

be employed in measuring the flow of water through a pipe line should be based upon the consideration of the difficulties of installation, permanency of operation, accuracy of measurement, and the cost of installation and maintenance. Tests to determine the practicability of employing thin-plate orifices in pipe lines, and the conditons most favorable for their use as measuring devices, have been completed by the Engineering Experiment Station of the University of Illinois under the direction of R. E. Davis, Associate in Civil Engineering, and H. H. Jordan, Assistant Professor in General Engineering Drawing. The tests were conducted with three sets of orifices of eight different diameters per set cut in 3/16-inch steel plates. Data were obtained from 4-inch, 6-inch, and 12-inch pipe systems respectively. The results of these tests are given in detail in Bulletin No. 109 entitled, "The Orifice as a Means of Measuring Flow of Water Through a Pipe." Copies of

The publications listed herein can be obtained on request. Keep a live file of catalogues and trade literature, Mr. Builder. It will pay you to keep posted

Bulletin No. 109 may be had without charge by addressing the Engineering Experiment Station, Urbana, Illinois.

American Fence, is the title of a booklet issued by the American Steel & Wire Co., Chicago. Gives data on wire fence products, together with instructions on how to build a fence. Fully illustrated.

Flat Wire Bulletin, also issued by the above company, illustrates various applications of flat wire to manufactured products.

Expanded Metal Construction, the monthly organ of the North Western Expanded Metal Co., Chicago. Illustrates various recent applications of their product, together with information along practical lines.

Micaspar, How to Use It.—A valuable booklet explaining the composition, manufacture, application and the various uses to which this facing aggregate may

be put. Published by Crown Point Spar Co., Crown Point, N. Y.

Experiment Station Record.—A digest and review of the current publications of the various agricultural experiment stations and of the U. S. Department of Agriculture. A cumulative publication issued by the U. S. Department of Agriculture, Washington, D. C.

Torrens and Real Estate Data for Cook County.—This pamphlet explains not only what the Torrens System is, but also includes a large amount of real estate information which is not generally available to real estate owners. Should be of value to owners, builders and real estate firms and may be had by application to 120 County Building, Chicago, Ill.

Technical Notes, the latest of the series published by the Forest Products Laboratory, Madison, Wisconsin. Each issue contains the results of recent experiments devoted to the study of the properties and the economic uses of wood.

Progress in Windows.—Discusses characteristics of the various types of windows. Published by Whitney Window Corporation, Minneapolis, Minn.

Concrete Streets for Your Town is one of the late booklets of the Portland Cement Association, Chicago. Its purpose is to stimulate interest in concrete paving for streets. Many photographic reproductions showing improved streets throughout the country.

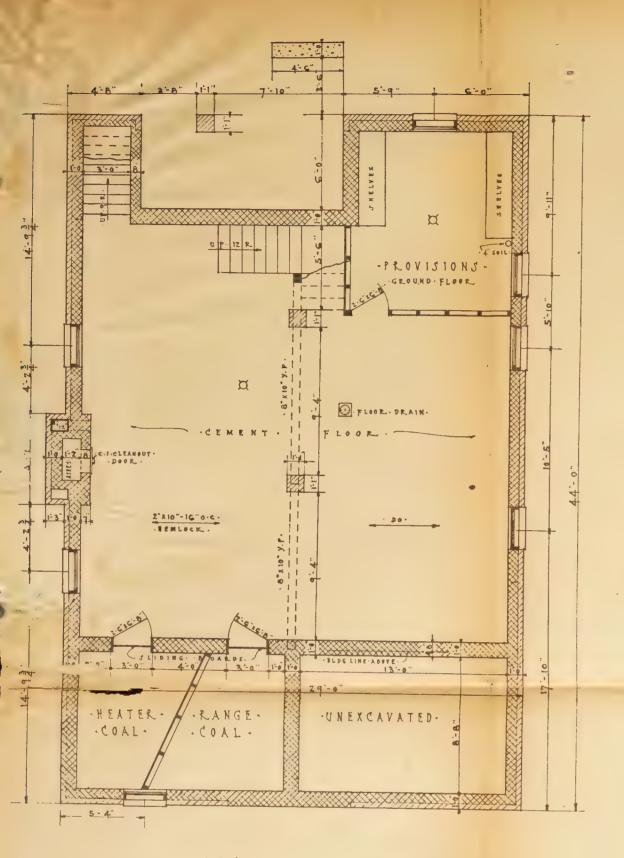
The Beaver Board Companies, a folder illustrating the growth of this product. The Beaver Board Companies, Buffalo, N. Y.

Monolog.—Descriptive and illustrative of the Sharp Rotary Ash Receiver, a cleanly and satisfactory method of taking care of furnace ashes. The Sharp Rotary Ash Receiver Co., Inc., Binghampton, N. Y.

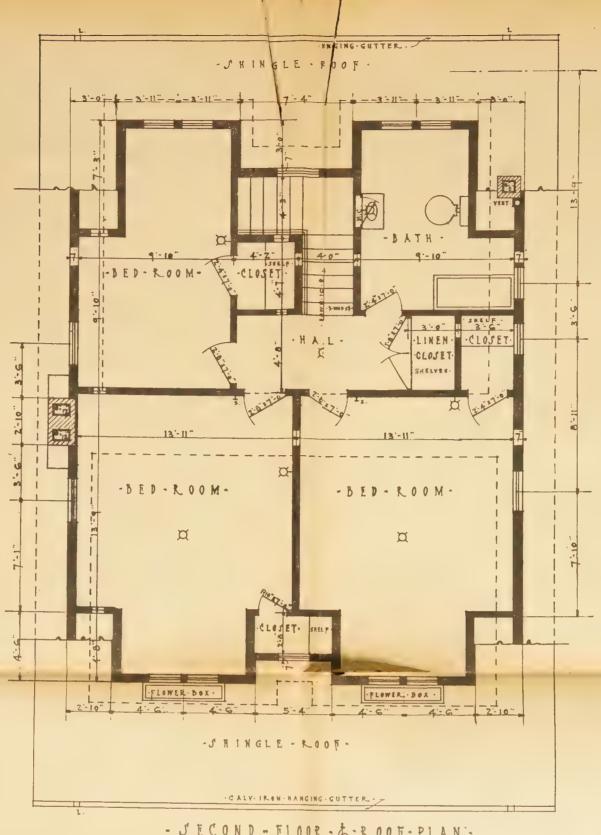
Lectures and Study Hours in the New York Metropolitan Museum of Art.—A series of leaflets descriptive of the opportunities for self-improvement offered to industrial workers by the department of industrial arts in the Metropolitan Museum, New York City.

"Creo-Dipt" Stained Shingle Houses.— Fifty photographs, 9x6, in a portfolio, of houses designed by celebrated architects, are issued under this title by the Creo-Dipt Company, North Tonawanda, N. Y. These exemplify the use of creosoted stained shingles for roofs and sidewalls and are accompanied by a number of informing leaflets.

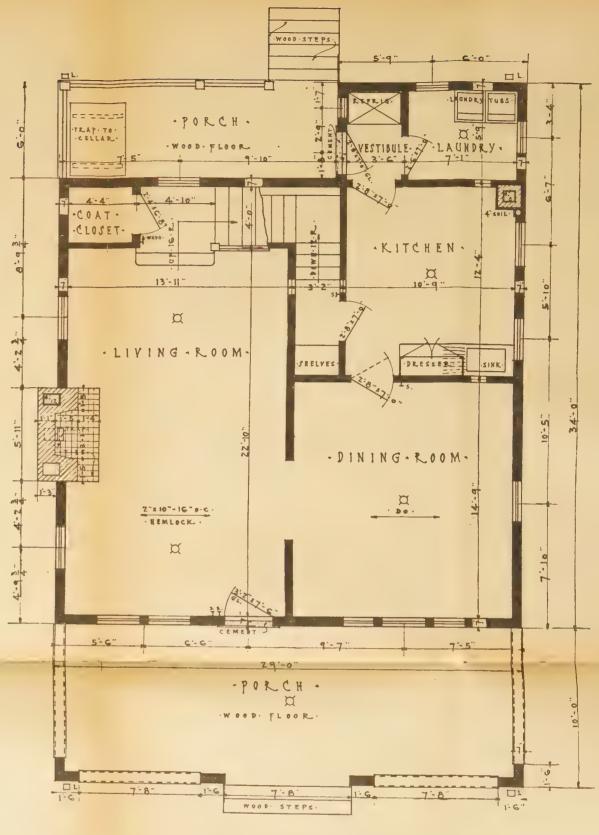




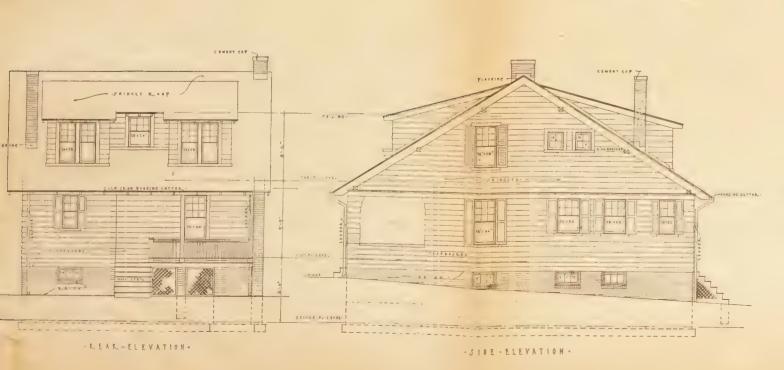
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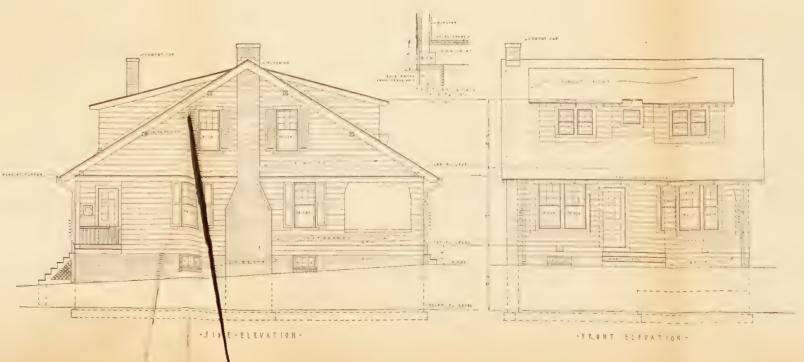


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NOVEMBER, 1919
SUPPLEMENT No. 471

A Cottage Bungalow Howard J Wiegner, Architect

Scale for plans 1/4 inch equals 1 foot. Elevations 1/8 inch equals 1 foot.

Photographic reproduction and description in reading pages.

File for future reference

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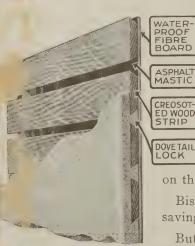
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C. H. & E. Mfg. Co., Inc 85	North Bros., Mfg. Co 92
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obove illustration shows the resof William Mills, Cedar Raptowa, in course of construction.

Med by Architect William J.

Stucco Contractor Charles R.
er. Bishopric Stucco Board



We are ready to give you wery service in connection with winter construction on Bishopric Board. Write us and get our Booklet.

DO NOT permit winter's interfering hand to halt your construction this year—apply Bishopric Stucco and Plaster Board to the studding or sheathing and proceed with the interior finishing.

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Bishopric Board's economy should influence contracts at this time. The saving on the average home is about 25%. This is a big point today!

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Tell your clients they can go ahead with their construction and specify Bishopric Board!

THE BISHOPRIC MANUFACTURING COMPANY 979 ESTE AVENUE CINCINNATI, OHIO



NATIONAL BUILDER

Vol. 62

Chicago, December, 1919

Number 12

The Situation and the Remedy

ON pages 60 and 61 of this issue of NATIONAL BUILDER appears a memorial to the United States Senate and House of Representatives by the National Federation of Construction Industries in relation to the needs of the building industry, together with the substance of the bills referred to.

The situation is that there is too much

bank deposits increased 59 per cent; stock and bonds owned by banks and insurance companies increased 68 per cent, and savings increased 200 per cent; while during the same period the combined real estate loans of banks, insurance companies and building and loan associations increased only 28 per cent, viz., from six billion one hundred and

February 1, 1919, was one hundred and eighty-nine million, a decrease of 60 per cent.

The continued use of accumulating funds for short term credits may be a large factor in maintaining inflation, and even in facilitating speculation, at a time when the absorption of funds into loans based on land and construction might



From the Chicago Tribune

As a nation we should be now creating new values, rather than concerning ourselves with the division of values already created. Whether this division be through barter, speculation or wage adjustment, it is dividing—not creating

money and credit extravagantly and unwisely used. This hinders the real prosperity of the country. To turn the spirit of the people from luxury to thrift by making wise investment both easy and attractive is the purpose of the bills before Congress.

The Financial Operations Committee of the National Federation presents these facts:

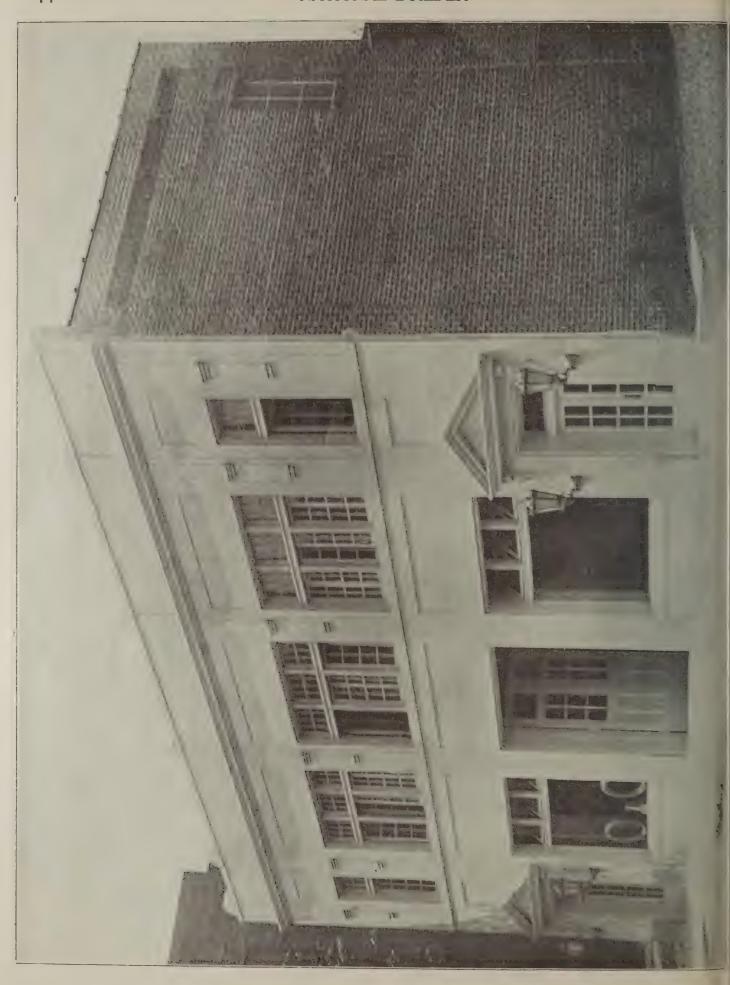
It is estimated that from 1913 to 1918 the total loans of banks in the United States increased 54 per cent; individual

seventy million dollars to seven billion eight hundred and ninety million dollars. It is probable that loans by individuals have decreased correspondingly, if the figures of New York City may be taken as typical of the whole country.

The average amount of money loaned annually on mortgages in Manhattan, the Bronx and Brooklyn during the tenyear period from 1905 to 1914, inclusive, was four hundred and seventy-two million. The average annual amount of mortgage loans from January 1, 1915 to

have healthfully retarded circulation and created permanent wealth.

Land and industrial development, the bases of production, were held in abeyance during the war. The nation is now suffering from a shortage of housing and general building construction. Legislative enactments are now necessary for their resumption. The enactment of Senate bills 2094 and 2492 and House bills 8080 and 7597 would be immediately effective.



A Two Story Garage

See Opposite Page and Supplement No. 472 in this Issue

BUILDERS are often confronted with the problem of putting up a building piecemeal. That is, a portion is to be built at one time, and later on an addition is to be built to it. This is particularly true of building today, when the general tendency is to postpone building operations as long as possible. All of us may not agree as to the advisability of thus staving off the inevitable with the expectation of building cheaper in the near future, but if a man considers that he is using good judgment in so doing, the builder may not consider it his duty to attempt to argue otherwise. However, the builder may be assured that it is legitimate to cite figures and facts.

There are, of course, other reasons for not putting up an entire building in one operation. Chief among these reasons is the economic waste of maintaining a large amount of space that will probably remain unused for a term of years. In such cases it is usually advisable to build for present needs only, and to await the normal growth of a business before proceeding with the entire building.

In many building operations this feature of future growth is overlooked entirely and only the present estimated volume of business is provided for in the design. Now, it is a commercial truism that no business can stand still for any great period of time; it must either go forward or go back. In view of this fact the logical provision to assume is that a business will increase and require more space in the future than is immediately necessary. The appropriate time to prepare for this future expansion is before any portion of the building is begun. Plans should be prepared with a view of taking care of any future expansion which may be found necessary, and the first building operation should include such portions of the future work as may be held necessary for the economical and satisfactory construction of the whole building. In many cases this foresight will cause but slight additional expense in the beginning, and if properly worked out will almost invariably be responsible for a considerable saving in the long run.

Most of us are familiar with remodeling jobs in which the existing structural members, walls, and so forth, are found to be insufficient to carry additional stories which it is desired to place on them. Also with "one-idea" plans which it is impossible to alter because of excessive cost. Either or both of these conditions occur so frequently that remodel-

ing work has come to the point where it is generally looked on askance by builder and owner alike. For this reason builders should make every effort to show their clients the advisability of preparing for future, as well as present, needs. This may or may not result in more work for the builder, but in any event it will usually result in increased respect for the builder's judgment and foresight.

These remarks, of course, have but slight reference to the average dwelling, although even here occasionally the same considerations are involved. With reference to commercial buildings, however, there is almost always an opportunity to take into consideration various features providing for additions and alterations.

The subject of the Supplement for this month has been selected to illustrate the above points and to show the comparative ease with which future work may be provided for. In this case the architect has displayed considerable ingenuity in developing a building which superficially appears complete, but one in which the floor area may at some future time be almost doubled without involving excessive trouble or expense.

The architect for this building was John A. Long, and it was designed for the De Long Motor Car and Truck Company of Pittsburgh, Pa., for use as a garage.

The walls are of brick on a concrete foundation, the street front of the building having stone facing. The roof is covered with prepared roofing and is supported by the second floor slab which is of a combination type of construction, reinforced concrete joists with steel fillers. This type of slab has several advantages over the solid slab; among others may be mentioned its comparative lightness and the small amount of centering which is required for its construction. The interior supports are of structural steel, fireproofed with concrete, and the windows in the side walls have metal frames and sash with wire glass.

The first floor supplies the present requirements for garage space. The basement provides space for the heating plant which is entirely cut off from the remainder of the building by means of solid walls and a fireproof ceiling. The basement also contains a wash room for cleaning cars. A heavy duty elevator has been installed to lower the cars to the wash room or to lift them to the second floor.

At the present only a small portion of the second story has been finished. The front portion contains a small apartment of four rooms and bath. This apartment is well arranged for present purposes, but it should be noted that it is of merely a temporary nature and that this space will eventually be given over to garage purposes.

An examination of the drawings will show that a full second story has been carefully provided for. The bearing walls and their buttresses have been built the required thickness to carry the additional load and the interior columns and the footings have also been made amply strong. The elevator shaft has been carried full height so that its machinery will not need to be disturbed when the second story is added. All of the public service lines and the heating plant have been proportioned to take care of the enlarged building and the additional water and heating pipes and the electric work have been provided for. Even the chimney which serves the office fireplace has been located so that it comes in connection with an interior structural column, thus offering but slight obstruction when the second story becomes a garage.

The entire second floor slab has been designed and placed ready to receive its future load. At present it serves as the ceiling of the first story and as a support for the temporary roof framing which is made of lumber. Thus the second story may be added without any interference to the use of the first story.

The front portion probably holds more interest than any other part of the building, as its development required a very large amount of ingenuity on the part of the designer. It was held that the street front should be entirely completed in one operation to preserve the appearance of the completed building. It was hardly logical to build a mere false front, so it was finally decided to temporarily change the character of this portion of the building by including a small apartment which could be easily removed and the space included in the second story garage. The rear and interior walls of the apartment are made of hollow tile, which is light and easy to remove, and the stair will eventually serve the entire second story just as it now does the apartment.

Any builder who has done much remodeling work will be quick to see that the man who completes this job will be "sittin' on the world" when it comes to a comparison with most remodeling jobs.

What is a Fair House Rent?

Builders are More Interested in House Rents Than Anyone Else, Because the Earnings of Buildings Lies at the Root of Building Enterprises—This Story Analyzes the Reasonableness of Higher Rents, according to Leslie H. Allen, of the Aberthaw Construction Co.

L ANDLORDS all over the country are in trouble with their tenants, because they find it necessary to raise rents. Ordinarily it is a mere question of supply and demand, and many a landlord has boosted his figures about as much as he thought the "traffic would bear." But when we examine the real facts in the situation, what do we find? While there have been many cases of apparent extortion, the fact remains that rents have increased, on the average, not over 20 per cent, in a period which has seen foods, clothing and other items of expense go up from 75 to 150 per cent. Because other things have increased in price is no reason for advancing rents. But how is the building owner situated with respect to operating costs on his

As a typical case, let us consider a two-family house built in 1900, which has five rooms downstairs and seven rooms upstairs. It cost the owner \$6,500, of which \$1,000 was land and \$5,500 was house complete. He invested \$3,000 cash and placed the other \$3,500 on a mortgage. His assessment on the property was \$5,000. What rent should he obtain from the two "halves" of the house? The fact that he actually rented these two portions at \$25 and \$30 respectively, or a total of \$55, has no direct bearing on the answer to the above question, says Leslie H. Allen, of the Aberthaw Construction Company of Boston, for it furnishes no evidence that the owner properly analyzed his costs or made adequate allowance for the

Let us examine the owner's costs and what ought to be his earnings, both in the light of prices and conditions as they existed in the first fifteen years of this century, what they are today and what promises to be tomorrow's scale.

His mortgage at 6 per cent (the prevailing rate in 1900 to 1915) would cost him \$210 per year. His taxes at \$20 per thousand per year would cost him \$100. If we allow \$25 for insurance and water, this makes standing fixed charges of \$335 per year, which have been practically maintained year after year, with only slight upward changes during the past few months. His minor repairs, which may be estimated at about \$20 a year under the old conditions, are now

at least \$35 for identically the same amount of work. While the growing decay of the house would normally make repairs much more necessary today than ten or fifteen years ago, this figure of \$35 will be used in the comparison. There is no janitor, and each tenant provides his own heat.

An old House must carry higher operating costs. But increased rents cannot be obtained as the competitive rents of new and well-equipped houses develop. Remodel now to equalize high operating costs and hold tenants.

Any building owner who rents his property must pay from that rental his mortgage interest, insurance and water rates and the minor repairs necessary from time to time. Ordinarily those are the only items considered in arriving at a proper rental figure; but the owner,

who is something of a financier—using the word in the most commendatory sense-looks farther ahead than this. He knows that the outside of his house requires painting every three years; that the inside requires painting and papering every ten years. He knows that in twenty years, more or less, he will have to put in new furnaces, put on a new roof and thoroughly overhaul his entire system of plumbing. It is these items of infrequent occurrence, but of large aggregate amount, which the ordinary small house owner or landlord fails to appraise or appreciate until they strike him a knock-out blow by their sudden necessity.

The cost of painting the outside of the house, which would have been about \$150 in the earlier years, would be around \$320 today. The cost of papering and painting the inside has likewise advanced from about \$300 to \$500. The installation of two new furnaces, one for each tenant, would have cost about \$200 ten or twelve years ago; today they cannot be put in for less than \$300. If new roofing had been required before prices went up it would have cost about \$220; today the figure would be nearer \$360. New plumbing, in so far as renovation would be necessary at the end of twenty years, would today cost no less than \$500, in place of the \$400 before the war.

These items, occurring at infrequent intervals, would not show in the owner's balance sheet normally until they had to be met. The farsighted owner, however, would make provision in advance, count up his cost, measure his cost and provide in his rent each year's pro rata share for each of these several items, which he knows are coming on as relentlessly as death and taxes. Under the earlier schedule of prices, as well as under the new, his yearly carrying charge for these items will be about as follows:

1910	1920
Painting outside of house\$50	\$107
Painting and papering inside 30	50
New heating plant 10	15
New roofing 11	18
Renovating plumbing20	30
Minor repairs, annual 20	35

\$141 \$255

During the period of low prices, now well behind us, the owner would have required \$476 per year to cover his interest, taxes, insurance, water and the pro rata share of the renovations covered in the above table. In addition to this, he should have had enough income from the house to pay him a satisfactory percentage upon his investment of \$3,000 cash. What should this percentage of return be?

He could have invested his money in the early years of this century in any one of a number of thoroughly good stocks which would have paid upwards of 6 per cent, and would have incurred no business risk-no risk of vacancies, no risk of dissolving in smoke and no risk of sudden damage from any one of a dozen sources which might affect the house. If it be assumed that insurance would take care of his fire risk, let us remember that while it might reimburse him for the actual cost of his building, it would not pay him his rental during the six-months period of rebuilding, all of which would be a total loss. To cover all of these items, it would only be fair for the owner to obtain perhaps 10 per cents upon the actual cash investment of \$3,000. Adding to this \$300 to his average annual outlay, we find that the rent of the two parts of the building under the old condition of prices should have brought some \$776, or approximately \$65 per month. This might be split into \$30 and \$35 respectively for the two parts of the house, or \$5 more for each part than was actually charged in the case under consideration.

As the owner has not received what we shall have to recognize as an adequate rental during the earlier years of the life of his building, he has not been able to accumulate a fund for depreciation as the building gradually wears out. This being the case, his rebuilding or renovating program must necessarily come from capital rather than from previous earnings, and this definitely adds to his actual investment in the property-an addition which share equitably in the annual earnings. Unless such a property has earned enough to provide in advance for contingencies, it is not on a healthy or thoroughly stable basis, and cannot be expected to act as a stimulant to the investment of money in such enterprises.

With the present high prices for every element entering into repairs and up-keep, the condition has changed considerably. In place of \$141 for renewals, we find that such renewals as will have to be made from now on should be provided for at the rate of \$255 per year. This makes his total fixed charges, so to speak, \$590 per year. Adding his nor-

mal 10 per cent return on his investment, we have a total of \$890 per year or \$74 per month. This might be apportioned at \$34 and \$40 for the two parts of the building, and even then does not cover the failure of past rentals to provide for the present high prices of roofing, plumbing and heating renewals. But the

0 0 0

Good construction means low depreciation costs—poor construction means high depreciation costs. This is true of all equipment. Temporary qualities have to be replaced - permanent qualities save more than the interest on their cost.

0 0 0

owner has carried the building more than fifteen years at a rate altogether too low to permit him to make the necessary renewals under present prices, and still come out whole on his investment. If, therefore, he were to raise the rent to say \$80, or \$36 and \$44 for the two parts of the house, which is not quite 50 per cent above the old rental figures, he would be obtaining for his property no more than it should bring him.

It will be noted that his \$55 per month, or \$660 per year, leaves him only \$70 per year as return on his investment, when present prices are considered. This is only 2½ per cent. Will any one argue that that is a fair return on money invested in an enterprise of ordinary business hazard?

There appears no indication that costs of operating and maintaining buildings will diminish. The cost of labor is continually rising, and it may well be that next year will see the upkeep figures decidedly higher than they are today, with a correspondingly greater deficit to be made up, due to insufficient rents in past years.

It may perhaps be unreasonable to expect tenants to look at the matter from this point of view. They have been accustomed to apportioning their outgo on the basis of a certain amount for rent and certain other amounts for other purposes. An increase of 40 or 50 per cent in one of the major items of expenditure will inevitably call forth strenuous protests. (We have been accustomed to consider rent as absorbing from one-fifth to one-fourth of wages and of small salaries.) Pure fairness, however, Mr. Allen maintains, requires that both sides of the question be examined and that a rental be fixed which will be fair alike to the owner and to the tenant. The average tenant would reject with scorn any suggestion that he pay a portion of the proper rent and receive the balance as a charity gift. Yet that is exactly the situation, when he pays less than the property ought in all fairness to bring, however strong his disinclination to pay more than he has been paying in the

Because rents are now too low on buildings, and because of the tenants' opposition to permitting them to reach a logical figure, building for renting purposes holds no attraction for investors The cost of construction is so much higher today than it was at the time our example was erected that a fair rental on a new building would be much higher than on the old. This is precisely a fact which tenants do not desire to recognize; but just as long as money has to be spent in the upkeep of a building and to pay for taxes and insurance on the building, and interest on money borrowed for its erection, just so long will it be necessary to fix a rental high enough to cover all of these items, and leave a fair profit for the man who provides the housing accommodation.

Molding Houses in Steel Forms

THE development and use of steel forms offers one of the most interesting features in connection with the growth of the monolithic or poured type of concrete house construction. Steel forms have been successfully employed on this type of work for a number of years, but it is only recently that their use has aroused any marked interest. This tardiness in recognizing their merits has no doubt been largely due to the

and steel wedges, and their faces are held apart by separators. The corner plates lap by, thus providing for walls of different lengths. There are four methods of using the standard plates; the method to be used depending on the size of the job and on the number of plates that are available. These wall-molding outfits range in size from one which allows the walls of each story of a house to be set up complete and poured at one opera-

their construction. Concrete houses that stand up well for so long a period of time may reasonably be expected to prove durable for a great many years to come.

The houses at Nanticoke, Pa., belong to a group of double houses that were built in 1912. They are fireproof houses, built entirely of reinforced concrete. All of the usual wood trim was omitted and the only wooden construction is that of



Fig. 1—Bungalow at West Chicago. Note the use of trelliswork and flower boxes to relieve the blank wall s urfaces

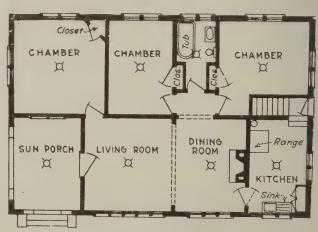
conservative attitude of the building profession toward methods of construction which have not undergone the test of time with respect to their durability and practical worth. Most of the reputable architects and builders are not inclined to favor a thing merely because it looks good; they demand that it also make good! If it fulfills the latter requirement its success and general adoption follows quickly. The value of steel forms to builders who do a comparatively smal! volume of concrete work is questionable, but their worth to builders who specialize in concrete construction is well proven. For jobs where speed is an important feature and for industrial housing developments and other similar projects, they are highly desirable and make for economy in the construction.

As a basis for this article, one of the oldest types of steel forms has been selected for description. This system has been developed by Milton Dana Morrill, the well-known architect, and it has been successfully employed on molded concrete houses by the government, by industrial concerns and by many architects and builders.

The standard unit in the Morrill system is a flanged steel plate 24 inches square. The plates are secured together, flange to flange, by means of "U" clips

tion, to the "two-mold" outfit which is suitable for small jobs. The outfits are simple, and unskilled labor may be largely employed in their operation. They are also durable and may be used on job after job. The accompanying

the doors and windows. The marks of the steel forms were allowed to remain on both the exterior and the interior walls of these houses. The walls were merely painted and no plaster nor other wall finish was used. This treatment,



illustrations show methods that are in common use.

The houses at West Chicago are part of a group of single houses that were built by aid of this system in 1911. The fact that these houses have proven satisfactory after eight years of service, offers evidence as to the practicability of the materials and methods used in however, proved rather unpopular and almost all of the later houses have plastered interior walls, and the exterior walls are stuccoed or rubbed smooth while the concrete is "green." These solid concrete houses are easy to keep clean and sanitary and may be literally flushed out with a hose if desired.

One of the latest housing develop-

Fig. 2—One of the houses at West Chicago, Illinois. A six-room concrete bungalow with an extended porch.



Figure 2



Figure 3

Fig. 3—AnotherWest Chicago house. The entire concrete work, including the cellar and first-story walls, was completed in four days

Fig. 4—Construction view of two of the West Chicago houses. The marks on the steel molds can be clearly seen on the house in the foreground



Figure 4

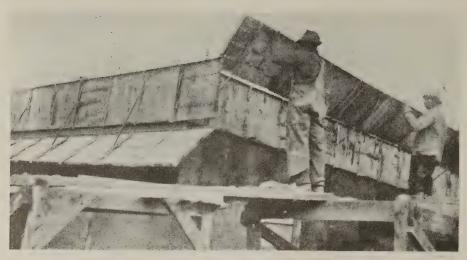


Fig. 5—"Swinging up the plates" (the two-tier method). U. S. Gov't, Department of Agriculture operation. Colored farm hands are doing the work

ments. on which this system has been used is that of the Overlook Colony near Wilmington, Del. This group is known as "the houses made of ashes" on account of the use of cinder concrete in their construction. The cinder concrete walls are reinforced with steel to add to their strength, and the use of wooden grounds for the attachment of trim and so forth was found unnecessary, as nails may be driven into cinder concrete in much the same manner as into wooden blocks.

In building the foundation walls, small stones from 4 to 6 inches in diameter were dropped into the concrete, and imbedded so that they did not show on either face of the wall. This scheme might properly be adopted for many light foundation walls, as the stones displace from 30 to 50 per cent of the volume of the wall, thus effecting quite a saving in concrete.

As a protection against the penetration of dampness and to add to the appearance of the houses, the exterior walls are finished with white portland cement stucco which was given a very pleasing "tapestry" texture. The interior surfaces are furred and plastered in the same manner as ordinary masonry walls. The door and window frames were placed in position as the work moved forward, and the concrete was molded around them, thus making a wind-tight joint between the frame and the wall.

For these houses the concrete was made in the proportion of one part portland cement, two and one-half parts of sand, and five parts of cinders. All measurements were by volume, and hydrated lime amounting to one-tenth the volume of the cement was added to the mixture. Water was added until the consistency of the concrete was about that of cooked oatmeal.

For molding the walls a one-tier "move-forward" outfit consisting of six pairs of steel plates was used. The steel molds were set up on the concrete foot-

ings and filled, forming the first course of the concrete foundation wall. As soon as the first lot of molds were filled, it was found that the first blocks molded were firm enough so that their steel plates could be safely removed. These plates were then moved forward and

course and a second course was started. These processes were continued, course after course, until the walls reached the height of the roof-plate. When this point was reached the molds were taken apart and made ready to be moved to the next job.

The cost of one of these complete house-molding outfits was about \$200, but as they were used on house after house, the cost per house was a small item. One of the smaller outfits, suitable for the isolated house or small foundation job, can be bought for around \$60, including the attachments for building corners.

Following are photographs and sketches representing work which Mr. Morrill has done at various locations. For years he has made a specialty of molded concrete houses and has gained a very complete knowledge of their construction and design. He is the originator of several very practical and novel methods of detailing mill-work for concrete houses, descriptions of which will be published in future editions of NATIONAL BUILDER.

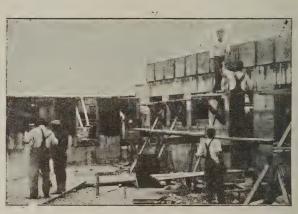


Fig. 6—Pouring cinder concrete for the Overlook Colony houses



Fig. 7—Construction view, showing the use of a spout in pouring the concrete

again set up and filled with concrete; by this time other plates could be removed, and the operation was repeated until the first course, or belt, of concrete was completed around the building. The molds were then set up on the completed

ANNUAL REFERENCE PLAN AND CONSTRUCTION NUMBER

The January issue of NATIONAL BUILD-ER will be a special number containing the best designs and plans of buildings classified and indexed for ready reference.

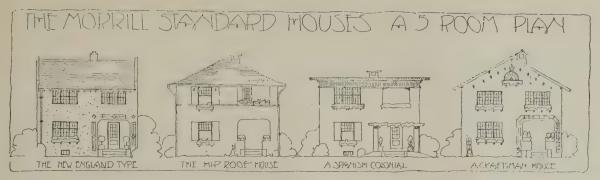
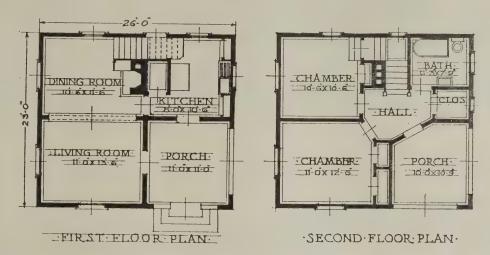


Fig. 8-Four different exteriors for the same standard plan six-room house



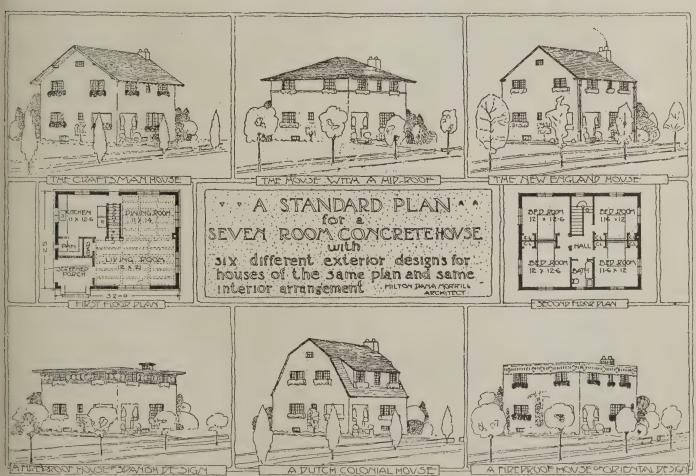


Fig. 9—Six different exterior designs of a seven-room house, each having the same plan and interior arrangement. This combines variety and economy



Fig. 10-Street view of some of the bungalows at West Chicago, Illinois



Fig. 11-Part of a group of firepro of houses built at Nanticoke, Pa.



Fig. 12



Fig. 13

Fig. 12—Interior of one of the Nanticoke houses. Fig. 13—Vines, trees and shrubbery add to the attractiveness of the Nanticoke houses

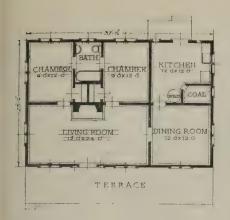


Fig. 14—A fireproof cottage of New England style. Residence of Mr. V. M. Hillyer, Washington, D. C.





Fig. 15—A view of a 39 - house group at Overlook Colony, Wilmington, Del.



Fig. 16—Note the use of plain cast-iron columns under this gable-overhang



Fig. 17—The five end houses of a 39-house row at Overlook Colony

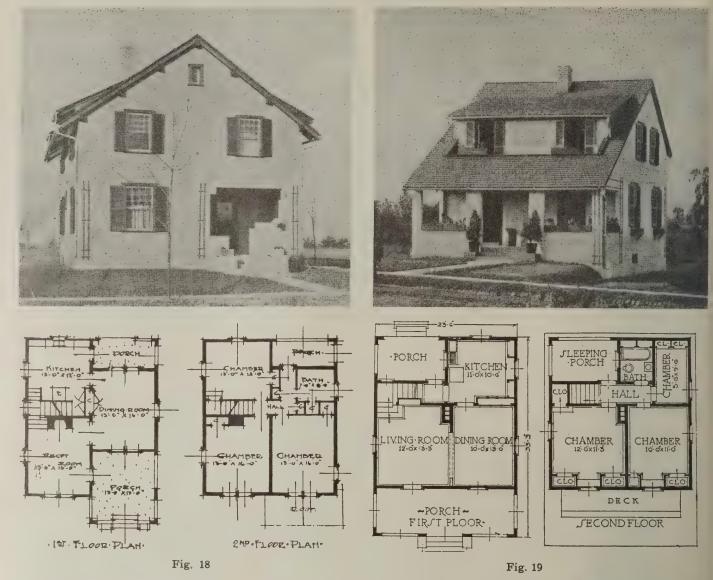


Fig. 18—A six-room concrete house in the Craftsman style. One chimney only. All the exterior woodwork is treated with creosote stain instead of paint. The house in the foreground of Fig. 4 also has this plan, but reversed. Fig. 19—A two-story cottage at Virginia Highlands, Va. The walls are white, the woodwork gray-green. The house has six rooms and bath. It is planned to save steps in housework. Note built-in dish closet between kitchen and dining-room,

Painting Structural Steel

H. E. D. asks for information about painting structural steel.

Red lead is a favorite paint for this purpose. Red lead is usually made from litharge and if it contains an excess of this substance and is mixed with oil, it soon becomes stiff and hard to work. Manufacturers now make red lead that is over 98 per cent pure, thus insuring it against this fault. Red lead may be obtained in paste form similar to white lead and thinned for use by adding linseed oil. Dry pigment may also be obtained and mixed with oil by the user. In the latter case from 25 to 30 pounds of red lead are mixed with one gallon of oil.

Other paints which give good satisfaction are made of graphite and linseed oil. Lampblack is often mixed with graphite paints with good results. Asphaltum is

also used as a varnish for structural steel.

An important requirement for a good job is that the steel must be perfectly clean. It is even more important for steel to be clean to receive paint than it is for wood. The pores of wood afford some mechanical bond for paint, but with steel the only bond is that of adhesion. All rust spots should be entirely removed with scrapers and wire brushes, using a hammer and cold chisel for cutting out rust pockets.

Two coats of paint are commonly used, but three are better. In two-coat work it is advisable to go over the edges and the rivets with a striping coat before the second coat is applied, as these points are likely to hold only a very thin film from the first coat. Allow at least a week between coats. All contact points

should be thickly painted. On important work the first coat is usually applied at the mill. In such cases it will be necessary to inspect the material carefully for places where the paint has been damaged by rough handling.

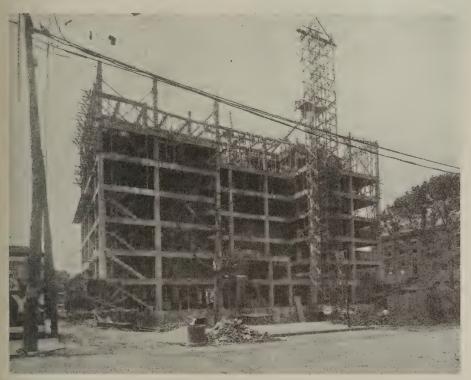
The importance of covering every portion of structural steel can not be too strongly emphasized. Under many conditions steel is more perishable than wood and carelessness in painting may be responsible for serious depreciation that may result in the failure of structural members. Shapes that are difficult to paint are avoided by conservative designers. This is an important reason for the growing disfavor for beam box girders—made of two I-beams with top and bottom plates—it is impossible to properly coat the inside of such a shape.

Notes on Reinforced Concrete

Second Article

THE discussion of reinforced concrete construction which appeared in the November issue of NATIONAL BUILDER ended with the general requirements governing column construction. The present article takes up the subject at that point and embraces further requirements governing good practice in reinforced concrete construction. At this point it may be well to call attention to the fact that the recommendations are to be employed as a guide for ordinary work and that special considerations must be employed for unusual condi-

drawings for minor work in which only a few reinforced concrete members occur. Very often a drawing will designate a column by a mere "note," stating, for instance, that the column shall be fifteen inches square and have eight 5%-inch bars. This tells absolutely nothing about how the bars should be arranged, nor how the necessary laps should be made; does not mention the ties, their size, nor their arrangement, and in general, such "notes" are of little value in so far as actual construction is concerned. Of course, on important work



No. 1—This hotel is for a town of 13,000 people. It illustrates the fact that reinforced concrete is coming into general use throughout the country

tions. For instance, it is mentioned in last month's article that columns should not have an unsupported length greater than twelve times their diameter. This statement does not mean that all columns should bear this relation of length to height, but that this should be the minimum diameter. It is often necessary to use columns having much larger relative diameters, as the exact size of a column must always be determined by means of formulas, and rule-of-thumb methods are not only out of place, but are highly dangerous to public safety.

The essential purpose of this discussion is to give information that is often omitted on drawings—especially those

the details are usually explicit and cover the requirements quite thoroughly, but even so, there are many points which cannot be made clear and the builder is often thrown on his own resources.

Columns

The vertical reinforcement for columns should never be less than ½-inch in diameter and not less than four vertical rods should be used in any column. The main reinforcement should be set truly vertical and should be secured against buckling by binding it with wire ties not less than ¼-inch in diameter. The spacing for ties should not exceed 12 times the diameter of the reinforcing

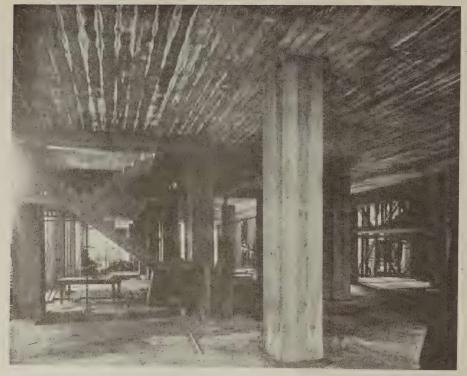
steel, but should not exceed 18 inches in any case. That is, if ½-inch reinforcing steel is used the ties should be spaced not more than 12 times ½ or 6 inches apart. The ties should be wired or otherwise secured to the reinforcement at every intersection.

For hooped or spiral reinforced columns the spacing of vertical bars should not exceed 2/5 of the diameter of the core (the core is the portion inside of the fireproofing), but should not be greater than 9 inches nor less than 3 inches. Thus for a column having a core diameter of 10 inches, the spacing between vertical rods should not exceed 3/5 times 10, or 4 inches. The size of hooping steel should be not less than 3/16 of an inch in diameter nor larger than 1/2 inch in diameter. The pitch of the hooping, or the distance-center-to-center of spirals, should be about 1/10 of the core diameter, but not greater than 21/2 inches. Thus for a column having a core diameter of 20 inches, the pitch should be about 1/10 of 20, or 2 inches. For columns greater than 18 inches in diameter use 4 vertical lines of spacers, and for colums less than 18 inches use 3 lines. Hooping should be secured to vertical reinforcement at each intersection.

Vertical rods should extend into the column above and below, a distance sufficient to develop adequate bond. For ordinary loadings the length of lap should equal about 30 diameters of the rod. Thus, for 3/4 inch rods the lap should equal at least 30 times 34, or about 221/2 inches. Rods longer than 11/8 inch in diameter and not subject to tension should have milled ends butted in close fitting pipe sleeves. The middle point of splices should not be more than one foot above the floor line. The length of stub bars for footings should be not less than 60 diameters and they should be embedded for one-half their length in the footing and one-half in the column. In case the footing is not deep enough to take the stub bars it will be necessary to use a metal bearing plate on the footing to take the load from the column reinforcement. In all of the above cases it has been assumed that plain bars are used, if twisted bars are used the length of lap may be reduced one-third. For instance, the length of stub bars may be taken at 40 diameters for twisted bars.

Floor Slabs

The minimum depth for floor slabs is 3½ inches, and for roof slabs 3 inches, not including the fireproofing below the



No. 2—An example of flat slab construction. Note the unobstructed ceilings. In this case beams are used around the stair well

reinforcement. If a finishing coat of cement is placed on top of the slab before the latter has set, the finishing coat may be included in the effective depth of the slab, but if the finishing coat is not applied until the slab has hardened it is not considered to add to the effective depth.

The spacing of reinforcement should not exceed twice the depth of the slab. That is, assuming a 4-inch slab, the maximum spacing for reinforcement would be 2 times 4, or 8 inches. Slabs reinforced in only one direction should have temperature rods laid at right angles to the main reinforcement, to prevent cracks due to shrinkage and temperature changes. 1/4-inch rods spaced at 20inch centers are usually used for this purpose. Combination floors (concrete joists with tile, gypsum or metal fillers) should have similar rods placed in the bottom of the thin slab just above the fillers

Beams and Girders

With ordinary loadings the depth of reinforced concrete beams and girders may be estimated by taking one inch of depth for each foot of span. Thus if a uniformly loaded beam has a span of 12 feet the depth of beam may be taken at 12 inches, not including fireproofing. This dimension is of course determined by the circumstances, and the beam may be deeper or shallower than this. The breadth is often governed by the space required for the reinforcement and the fireproofing. The clear spacing between bars for beams and girders should never be less than 1½ times the greatest cross

sectional dimension of the bar. That is, assuming 34-inch round rods, the clear spacing should be not less than 1½ times 34, or 1½ inches.

Wherever practicable the reinforcements should be placed in one layer, but in cases where there is a large number

of bars it is often necessary to make two layers of them in order to keep the beam from being too wide. In such cases the clearance between layers should be not less than 1 inch.

Beam rods should extend at least 8 inches beyond the face of the beam supports and to within 2 inches of the end of the beam. If the ends are turned down into the beam, the bond will be increased materially. Slab rods should extend at least 4 inches beyond the face of supports and to within 1 inch of the end of the slab.

Under usual conditions it is considered good practice to bend one-half of the reinforcement up over the supports. In ordinary slabs, beams and girders the bends usually begin at ½ of the span near each end. That is, assuming a span of 15 feet the bends would begin at ½ of 15, or 3 feet from each end. The bent rods are carried up at an angle to within 1 inch of the top of the beam or slab and are then run straight until beyond the face of the support.

Splices in reinforcement for beams, girders and slabs should be avoided, but when they are necessary they should be so arranged that they do not occur near the center of spans. When a large number of splices are used, as is sometimes necessary in slabs, they should be well staggered. Splices are usually made by lapping the reinforcement. The following table gives the length of the laps required:

TABLE FOR LAPPING REINFORCEMENT

	of Bar	Plain Bars	Twisted Bars	
	inch		10 inches	
	inch		13 inches	
	inch	21 inches	15 inches	
	inch	29 inches	20 inches	
5/8	inch a best	36 inches	25 inches	
	inch		30 inches	
7/8	inch	50 inches	35 inches	
1	inch	57 inches	40 inches	



No. 3-Cast-iron column bases to be used on top of reinforced concrete footings

Stirrups

When stirrups are used in beams or girders they should be securely attached to the reinforcing steel at both top and bottom. The number and spacing of stirrups is governed by the conditions, but stirrups should never be spaced farther apart than 4/5 of the depth of the beam. For instance, assuming a beam 20 inches deep, the maximum spacing for stirrups is 45 of 20, or 16 inches apart. If any stirrups are required it is well to use plenty and they should be continued across the middle of the beam as well as at the ends. Stirrups are usually made of 5/16 or ½ inch rods beut into a U or W shape. A rule that may be used for approximate estimates is to take one stirrup for each foot of beam span and to assume the spacing as follows: Divide each half of the beam into three parts; place 1/4 of the total number

only approximate and for accurate results the stirrups must be calculated by formulas.

Walls

Exterior walls in reinforced concrete construction are usually considered to carry only their own weight. They are usually made eight inches thick, as it is impracticable to pour a thinner reinforced wall. Their reinforcement may be of 1/4-inch vertical and horizontal rods, forming a grillage near each face of the wall. These rods should form meshes not more than eighteen inches square and should be tied together with stove wire at each intersection. Extra rods should be provided around all openings, and the top, bottom and sides of the wall should be secured to the structural members with stub-bars.

Non-bearing interior walls or partitions are often made of wire mesh or



No. 4-They let this one grow until it was ripe. A full-grown mixer "on the job"

of stirrups in the division nearest the supports; place 1/6 the total number in the next division, and 1/12 in the division nearest the center of the beam. If these spacings do not work out evenly, use the spacing that comes nearest to them. As an example of estimating the number of stirrups required and their spacing, assume a beam of 18 foot span. Taking one stirrup for each foot of span, 18 stirrups are assumed. The first division is to have 1/4 of the total number of stirrups or 1/4 of 18 which equals 41/2; the second division has 1/6 of 18, or 3 stirrups, and the third division has 1/12 of 18, or 11/2 stirrups. Say 5 for the first division, 3 for the second, and 2 for the third. As stated above, this method is expanded metal and cement plaster. The thickness of such partitions should not be less than three inches and the metal should be exactly in the center of the wall so that it will be protected in case of fire.

Exterior and interior bearing walls should have a thickness not less than two-thirds that of corresponding brick walls, but not less than eight inches, in any case. They should be reinforced in a manner similar to exterior curtain walls, but the amount of the reinforcement is governed by the load that is to be carried.

Flat Slab Construction

In flat slab or girderless construction

the use of exposed beams and girders is almost, if not entirely, avoided. The slab is carried directly by the columns which have expanded caps to take the load. In some systems this cap is exposed to view underneath the slab, while in other systems the cap is concealed in the slab. There are two general types of flat slab construction, one of which is known as "four-way" and the other as "two-way." Each of these types are divided into several systems which are controlled by various concerns. In order to employ flat slab construction it is necessary to pay a royalty to the owners of the patents or to their licensees.

The principal advantages claimed for flat slab construction are that the formwork is simplified; the absence of beams and girders permits better illumination for the interior; allows the moving of partitions without detracting from the appearance of ceilings. Permits a saving of one story height in every eight or ten; the loads are carried directly to the columns; and the reinforcement radiates in such a manner that the entire floor and column system is tied together in one monolithic structure.

The design of flat slab systems requires a large amount of experience with this type of construction, and its erection should be in charge of a thoroughly experienced superintendent.

Cutting for Pipes, etc.

All of the necessary precautions should be taken to avoid disturbing the construction after it has been placed in position. This means that the drawings must be carefully studied so that the exact locations of chases, pipes, conduits, stair openings and all other similar features may be determined beforehand. In the absence of detailed instructions it is advisable that all of the contractors hold conferences at proper times so that delays and changes will be rendered unnecessary. Anyone who has watched a workman cutting a hole through a hard concrete slab and its network of reinforcement will recognize that this is an expensive proposition as well as one that is likely to seriously endanger the safety of the construction.

Finally, a material is often blamed for a failure, when the real fault should be borne by a man who was ignorant of its proper use and application. Some engineers take the stand that the average builder has no business with a knowledge of engineering practice. This attitude may be laid to professional jealousy and also to the fear that incompetent builders will attempt to design structures and that these will prove unsafe. It seems, however, that if builders have a general knowledge of the elements of engineering there will be less

occasion for mistakes on the job, and that the builder will also have a higher regard for the importance of the engineer's instructions. He will be brought to understand that there is a real reason for doing a thing in a certain manner and that the engineer is not merely a petty tyrant who is anxious to display his authority.

Of course, it should be understood that this discussion deals with the requirements of construction and does not attempt to go into the more involved questions of design. As a further aid to safe construction it is highly desirable that builders have a clear knowledge of the rudiments of reinforced concrete design. It is therefore suggested that a copy of "Fundamentals of Reinforced Concrete Design," a booklet distributed by the Portland Cement Association, Chicago, be obtained and studied. This booklet contains only 18 pages and is entirely free from the highly technical discussions which often becloud the more elaborate text books on this sub-

Comparative Durability of Green and Seasoned Timber

Opinions of wood users have always differed as to the comparative durability of untreated green and seasoned timbers when used for poles, posts, or ties. Recent experiments conducted by the Forest Products Laboratory indicate that there is practically no difference in the relative durability of untreated green and seasoned timbers when exposed to the weather and in contact with the ground.

The following service records of ties laid by the laboratory in co-operation with the Northern Pacific Railway bear out this conclusion:

Life of Green and Seasoned Ties

		Green or	Average life
Place-	Species	Seasoned	in years
	WashDouglas Fir	Green	7.7
	WashDouglas Fir	Seasoned	7.8
	ontDouglas Fir	Green	7.6
Plains, M	ontDouglas Fir	Seasoned	7.7
	Western larch	Green	7.3
	Western larch	Seasoned	7.4

In each of these cases the average life of seaoned ties was only one-tenth of a year longer than that of the green ties. This difference is obviously so slight as to be negligible.

Periodical measurements on poles made by the laboratory in co-operation with the American Telephone and Telegraph Company show that the rate of decay in green poles is a trifle less than in seasoned poles.

The fact that green and seasoned timber have the same durability when used in exposed places is easily explained. Moisture content is the principal factor in determining the rate of decay of a

stick of timber. As soon as the timber is placed it begins to take up or give off moisture, according to its condition of seasoning and the conditions of exposure. Within a relatively short time in exposed construction both green and seasoned timber reach the same moisture content.

When used in buildings, however, wood

does not usually dry out rapidly after being placed. Wood for interior construction must be seasoned before use, otherwise, it is likely not only to shrink to a serious extent but also to decay before it seasons. Very expensive building repairs have been necessitated by the use of green timber.

Hydraulic Pressed Steel Concrete Forms for Protection Walls

By Frank C. Perkins

The accompanying illustration shows the hydraulic pressed steel concrete forms developed at Cleveland, Ohio, as used in building the 33-foot White River Flood protection wall at Indianapolis, Ind. The work was done by Kuert Contracting Co., Inc.

It will be seen that the forms consist of uprights which are aligned and accurately

backed with 1¾-inch T. and G. pine planking, and the edges are protected and stiffened with pressed steel channels. The ends are of pressed steel angles welded to the plate.

It is clear that the wood face may be used against the concrete where a rough surface is desired for plastering or for nailing in-



Hydraulic pressed steel concrete forms as used in building a 33-foot White River flood protection wall at Indianapolis, Ind.

spaced 3 feet 3 inches center to center by pressed steel liners. Between these uprights are clamped steel faced plates. It is claimed that any plate can be placed or removed at any time without disturbing any other plate, and the uprights can be erected and aligned and reinforcing then installed before plates are put in place. The forms are light, rigid and strong. Three men can erect or take down all parts of the forms, and on work where overhead cranes or cableways are used, forms can be fastened together so as to make large units. The uprights may be spliced together with pressed steel splices and carried to any height.

The plates are made of pressed steel,

serts or plugs. The wood core is creosoted to preserve and waterproof same and is easily removed and replaced when worn out.

A continuous hollow wall may be built up to ten feet in height. Galvanized wall ties are fastened between uprights. These ties support tapered channels in which wood plates are placed and kept apart by channel wedges. After walls are poured the wedges are pulled up, collapsing the plates, which are then removed. The tapered channels are also removed and the wall ties are left to tie the two walls together. By this method houses with hollow walls may be poured one story at a time.

Estimating Brick Work

By I. P. Hicks

BRICK, as made by different manufacturers, vary in size, and, of course, there is sure to be more or less variations in the actual quantities required for certain jobs; the variations depending upon the size of the brick and the size of the mortar joints made in laying the brick. For the purpose of estimating we will assume as near as we can the average size of brick as we find them on the market. For the common brick we will assume it to measure 8½x4x2½ inches and that the wall is to be laid up with a 3%-inch mortar joint.

For this kind of a wall figure 6 brick to each square foot of wall for every 4-inch thickneess of wall. Thus, for a wall 4 inches thick, figure 6 brick per square foot; for an 8-inch to 9-inch wall, figure 12 brick per square foot; for a 12 to 13-inch wall, figure 18 brick per square foot; for a 16 to 17-inch wall, figure 24 brick per square foot and so on, adding 6 brick for each 4-inch thickness of wall.

To be very accurate in the number of brick required, deduct the brick required for all openings. In small foundation work, where there are only a few small cellar window openings, it is hardly worth while to deduct the openings, but for the main windows and doors in a brick building, it becomes necessary to deduct the brick for the openings, otherwise the result would be far too many brick.

BRICK FOOTINGS

Brick footings, based on steps or offsets of 2 inches, may be estimated by the lineal foot, as follows: For a 9-inch wall, 2-course footing, 10½ brick; 13inch wall, 3-course footing, 22½ brick; 18-inch wall, 4-course footing, 39 brick; 22-inch wall, 5-course footing, 60 brick; 26-inch wall, 6-course footing, 85½ brick.

PRESS BRICK

For a standard size of press brick we will assume the following dimensions: $8\frac{1}{4} \times 4 \times 2\frac{1}{4}$ inches, and the mortar joint to be $\frac{1}{4}$ inch. This will require 7 brick per square foot for every 4-inch thickness of wall.

MORTAR FOR BRICKWORK Lump Lime Mortar

The quantity of material required to lay 1,000 brick with a %-inch joint, using 1 to 2 lime mortar, composed of 1 part lime putty to 2 parts sand, will be 134

barrels of lump lime and 5%-cubic yard of sand.

Hydrated Lime Mortar

For mortar composed of 1 part hydrated lime and 2 parts sand, figure $6\frac{1}{2}$ 50-pound sacks of hydrated lime and $\frac{5}{8}$ cubic yard sand per 1,000 brick.

Cement Mortar

For 1 to 3 cement mortar composed of 1 part Portland cement and 3 parts sand, figure 5 sacks of cement and 5/8-cubic yard of sand per 1,000 brick, with a 3/8-inch mortar joint. Approximately 2½ bags of cement and ½ of a cubic yard of sand will be required if laid with about a ¼-inch joint.

Cement and Lime Mortar

Figure 1 sack of Portland cement, 34-barrel of lump lime and 5%-cubic yard of sand per 1,000 brick laid in the wall with a 3%-inch mortar joint.

ESTIMATING BRICK FOR CHIMNEYS

Sizes Given are Inside of Flue Measure

8x8 flue, 24 brick per lineal foot.
8x12 flue, 28 brick per lineal foot.
12x12 flue, 32 brick per lineal foot.
12x16 flue, 36 brick per lineal foot.
16x16 flue, 40 brick per lineal foot.
8x8 double flue, 40 brick per lineal foot.
8x8 and 8x12, two flues, 44 brick per lineal foot.

8x12 double flue, 48 brick per lineal foot.

8x12 and 12x12, two flues, 52 to 56 brick per lineal foot.

Chimney breasts for fireplaces mantels require 90 to 110 bricks lineal foot the height of the chim breast. Where the chimney is reduce in size above the breast, figure accord ing to the size and number of flues from there to the top as given above. Thes figures should enable one to arrive at very close figure as regards the numb of brick required. In the above figu no allowance has been made for waste in brick and it would be to allow a small percentage for and wasted brick. If the brick good quality, 3 to 5 per cent cover all the waste in handling

LABOR COST OF LAYING BRIG

The labor cost of laying brick varies according to the wall, the bond and the kind of mortar joint made. Common brick laid with common bond and plain cut joints: a bricklayer, with one tender.

should lay 1,100 brick per 8-hour day, using cement mortar, and 1,350, using lime mortar.

For walls laid in common bond with struck joint one side and plain cut joint on the other side, figure 1,000 brick per 8-hour day, using cement mortar, and 1,200, using lime mortar.

For face walls laid up with selected common brick in common bond and struck joints, figure 950 brick per 8-hour day, using cement mortar, and 1,000 for lime mortar.

For face walls laid with selected common brick in common bond with v-shaped mortar joints, or with joints raked out, figure per 8-hour day, 900 brick, using cement mortar, and 950, using lime mortar.

Face walls laid up with press brick or face brick where there are panels and pilasters, figure 350 to 400 brick per 8-hour day.

For plain walls laid up with press or face brick, figure 700 to 800 brick per 8-hour day.

Figure laborer's time same as brick-layer's time where there is but one brick-layer working; if two hours are working, figure ½ hours for bricklayer

A House for a Hillside

A N irregular building site is usually the basis for a design that is out of the ordinary. In such a problem the opportunities for doing something different often mislead the designer into developing a highly complex problem instead of proceeding along simple and rational lines.

The house illustrated in this article is located on the bluffs of Lake Michigan. The ground slopes sharply downward to the shore level, a hundred or so feet below the level of the house. Thus the problem included not only an irregular site, but it was required that the principal rooms must be so disposed that they would have an outlook over the lake.

An examination of the plans discloses how successfully the architect has solved the problem. The front of the house faces the street. The principal rooms are at the rear, overlooking the lake. The doors opening onto the sun porch are glazed—French doors—so that a vista is obtained right through the sun porch and onto the lake.

A terrace surrounds the house on the front and sides, sloping down near the rear of the house to another terrace on a



The house is carefully designed so that it is attractive from any angle. The appearance from the rear is almost as pleasing as this is

The fireplace flanked by bookeature

gth windows, which give plenty and the derivalls. A coal chute is placed in the side-wall so that coal may be conveniently put in.

On the first floor, the coat cases in the vestibule are only about 4 feet 6 inches high. Small windows are located above

these cases so that the vestibule is well lighted.

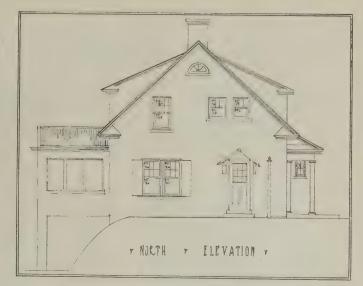
The hall on the second floor is large and well lighted. The extra toilet compartment next to the bath room is a practical convenience which, considering the small increase in cost, should be installed more frequently. The open balcony along the rear could be easily transformed into an ideal sleeping porch at small additional expense.

The exterior of the house has considerable Colonial feeling without belonging entirely to that style. It is an attractive example of the possibilities in adapting this style to conform to individual ideas. The arched trellis at the side, shown in the drawing of the front elevation, marks the entrance to the kitchen and adds considerably to the looks of the house. Cover it up with your finger and see how much the house loses by its absence.

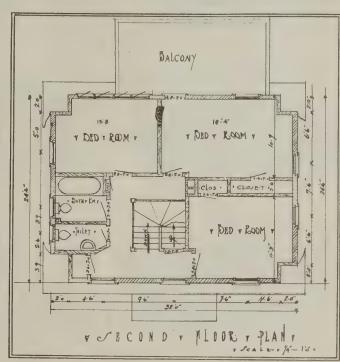
The basement walls are of concrete. The walls above grade are of hollow tile covered with stucco, which is colored with yellow ocher. The pilasters around the entrance vestibule are unusual from the fact that they are made of cement, moldings and all.

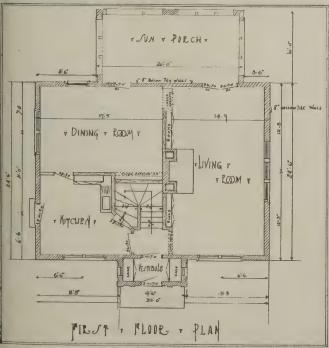
This house is located at Waukegan, Illinois, and is owned by Mr. L. P. Erskine. The architect was C. W. Webster of that city.

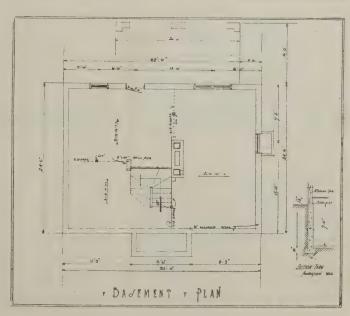






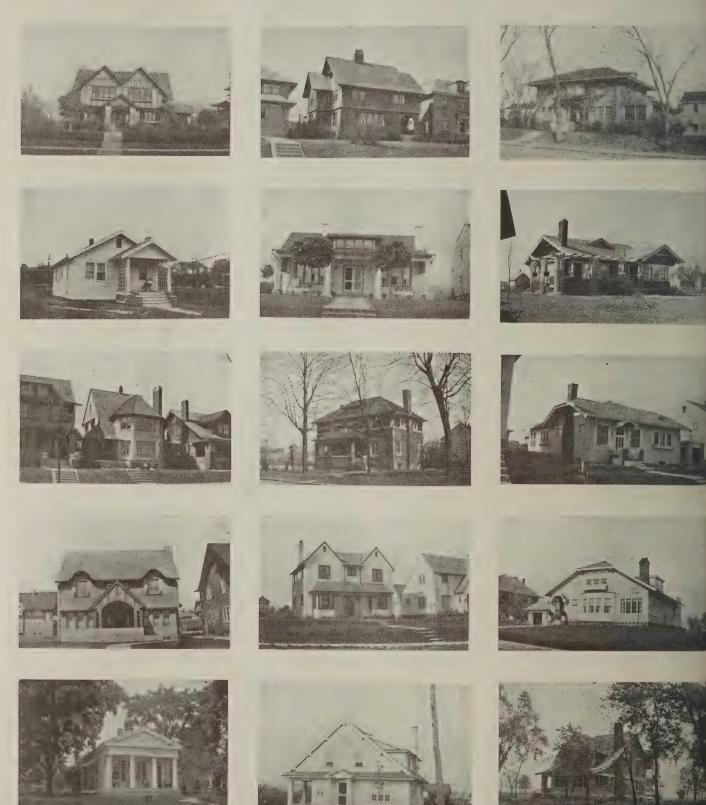






Twentieth Century Homes

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Building a Tin Covered Dome

Square at the Eaves and Octagon Shape at the Top

By John Y. Dunlop

THE setting out and cutting of the various members of a dome is always an interesting problem to the woodworker and I am sure that this can be said of the present example. The dome shown in the line drawings was erected by the writer over the musicroom in a school. In the description I have left out the ceiling and other details and deal solely with the dome.

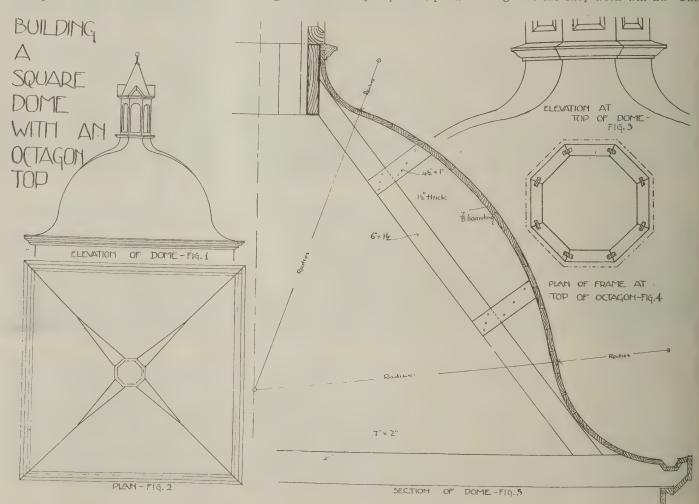
The plan of the roof at the eaves is

the job. There was no setting up in temporary fashion, all the measurements being taken from the drawing board on which all lines and true shapes were set out in the graphical method.

The first thing which was done was to take the measurements of the job. Not only the length and breadth—which in this case was supposed to be the same—but also to test the shape of the existing framing. This is a very important point

square on the drawing board, while the existing framing had been built with one diagonal three inches shorter than the other.

Of course, the framing should not have been that way, but the question that arises is that as the dome must be cut to fit the framing as erected, would it not be an advantage to take careful measurements at the beginning, thus insuring that the shop-work will fit. The



square and this shape is maintained until the middle of the height is reached, where it gradually changes into a regular octagon shape at the top. An octagon-shaped wooden ventilator was fitted into the octagon ring at the top of the dome.

This job was entirely cut out ready for erecting in the shop, each piece being set off, cut out, marked for the position it was intended and then sent to where the job is to be cut out and possibly also built in the shop previous to being completed at the job. In such cases many a good job is spoiled for the want of trying diagonals to see if they are of the same length. I have in mind a job where the foreman just took it for granted that that existing framing was all right and that all he required was the general measurements. The result was that the job was laid down

only way in which the shop-work can be right is to lay it out to fit the sizes and the shape as they actually are on the job, and not to assume that the existing framing was correctly laid out to begin with.

To lay out the work, draw the lines of the ceiling joists according to the detail drawing at Fig. 5. Allow the joists sufficient projection at the walls. From this the long ceiling joists can be cut and

shaped at the band saw.

The short joists and the angle joist can also be laid out from this drawing.

To lay out the angle joists, project the several points on the shape of the end of the common joists onto a line at 45 degrees, which is the angle that the angle joists make with the common joists. See Fig. 14. Then project the same lines at right angles to the 45degree line and on these mark off heights to correspond with those on the shaped end of the common joist. Draw the true shape of the angle joist by tracing lines through those points. See Fig. 6. The end of the short joist is generally checked onto a fillet, which is nailed along the outside of the first and last long joist. These checks can also be taken out with the band saw.

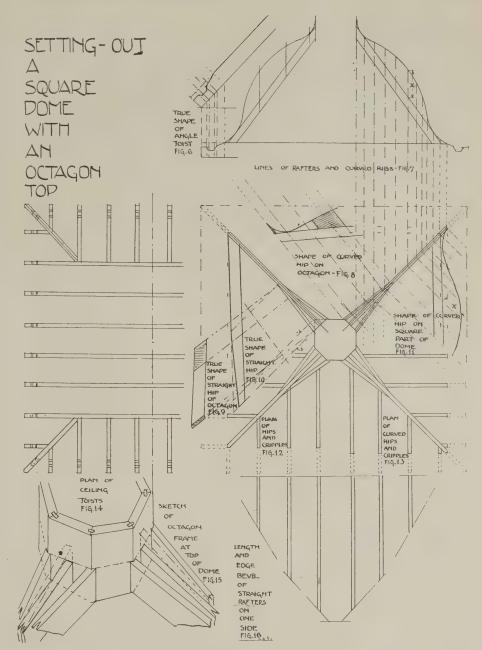
In setting off the joists and the curved ribs for the dome, the approximate shape of the section of the dome of the cornice should be obtained from the architect's drawings. See Fig. 1.

In laying out the dome, it will be found most convenient to set off the line of the face of the octagon frame at the top and the ends of the joists at the bottom; then set out the three centers and draw the line of the curved ribs, and afterwards add the rafters. See Figs. 5 and 7.

All of the rafters are cripples, or in other words, there are none of them the full length of the sloping sides of the roof. In Fig. 12 is shown a part plan of the cripples and hip rafters. While at Fig. 13 is a part plan of the curved ribs. There is very little difference in the plan of those two parts of the dome except that the ends of the circle ribs come a little nearer the eaves of the roof.

With the plan of the framing set out, the next thing to do is to get the length of the straight trip rafter. See Fig. 10. This is shown in the usual way by setting up on the plan of that member the height and drawing the true side view. In this particular case care must be used in setting off the height because of the changing shape of the dome. Of course, if the shape at the top of the dome were square, the height of the hip on the square could only be the same as the height of the common rafter.

Now let us square one corner of the frame at the top of the dome, which is done in the drawing by dotted lines, and from this right-angled corner set off a line "a" at right angles to the plan of the hip. Now if we set off the height of the common rafter on this line and draw the line of the hip we will have its true shape. But the plan of the hip rafter shows that it travels in past the square corner which we have drawn until it meets the octagon frame, and this little bit has to be added on. Draw a line "b"



at the line of the octagon and at right angles to the plan of the hip. Then extend the lines of the hip until they meet this dotted line and we have the true length of the hip rafter on the square.

Of course, as the hip is shown with the dotted lines in the drawing it is too high for the other rafters and what we want to do is to cut a wedge-shaped piece off the top edge at the highest end, so that the top edge which butts against the octagon frame will be the same height as the common rafters from the top of the ceiling joist.

At first glance it is possible that the cutting of this wedge-shaped part from the top of the hip may appear a little strange, but if reference is made to Fig. 15 it will be seen what would be the results if the straight hip was cut and set in line with the square side of the dome without this wedge-shaped piece being cut away. From the point where

the short, octagon hips meet, the hips would gradually rise higher and higher until at the apex they would be several inches above the line of the roof on the sides.

The true shape of the short, octagon hips at the top of the dome is shown to the left of the hip on the square. These would be cut in pairs, with a long side bevel on the lower end and birdmouthed at the top.

The top and bottom bevels of the cripple rafters are obtained from Fig. 7, which also shows the true length and the side bevel.

With all those straight members cut the next operation is to obtain the shape and cuts of the curved pieces which go on top of the straight rafters.

The outline of these curved members for the common rafters is shown in Fig. 7.

The true shape of the curved rib on

the square hip is shown in Fig. 11, while the portion on the octagonal part of the hip is shown in Fig. 8.

The true shape of these hip ribs is obtained by dropping any number of projections from the common rib to meet the center line of the plan of the hips. Then they are projected at right angles to the plan of the hip and the heights in the new shape made to equal those in Fig. 7.

That is, in Fig. 11 the dimension "x"

is made equal to the corresponding dimension "x" taken from Fig. 7. Any number of points may be determined in this manner and the curve drawn through them.

To obtain the fine shape of the curved rib of the octagon hip, the projectors are also taken from the common section, but this time they are first projected from the center line of the long hip until they intersect with the center line of the short, octagon hip. Then, at right angles to the center line of the short, octagon hip, project these lines as shown in Fig. 8. The points of the curve are determined as in Fig. 11.

The backing of those members should be formed with a draw knife when the hips have been fixed in position and just before the cripple rafters are put up.

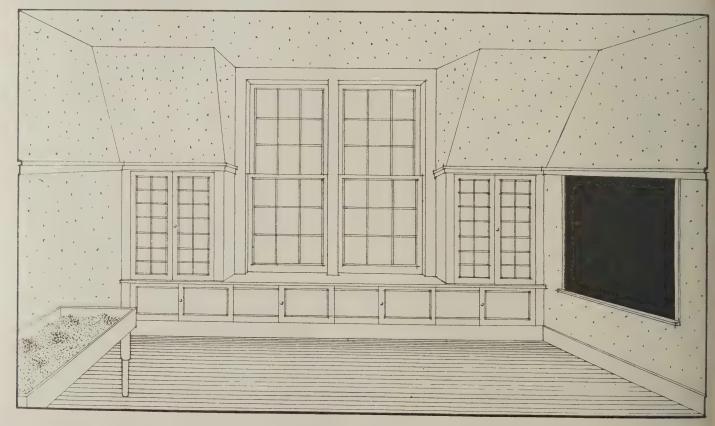
The boarding of the dome is shown plain jointed, but it should be carefully laid and cleaned off to form an even surface for the dome covering.

A Children's Playroom

By Margaret S. Stoner

BUILDERS everywhere should take a hint from the growing popularity of children's play rooms in city apartment houses. Nowadays, almost all high-grade apartment houses have play rooms

it, the little people are really entitled to one room in which to develop their own ideas of work and play without being constantly under scrutiny and under foot. Many people I know have built it is properly heated and ventilated, so that it is not put out of commission in the very cold days or the very hot ones, when it is most needed. If a heating riser is run to the attic when the house



A Children's Playroom

provided either in the attic or in the basement. Of course, the living conditions in cities and those in small towns or rural districts are entirely different. Yet, if it is possible in the family scheme of life to provide the children with a real play room, it will pay. To have no playplace set aside is almost as hard on the grownups in the house as on the children, and when you stop to think about

their homes for their children; they say so and sincerely believe it, yet a glance at the plans would lead one to believe that they wanted the children to wait until they were grown before really enjoying it. There is not a sign of a play room or nursery, the attic is either entirely unfinished or without heat or lighting facilities.

An attic makes an ideal play room if

is built, and the electric wires extended so that they may be connected later, it may save considerable expense in the years to come and the extra cost at the time the house is built is hardly worth considering. Forehandedness probably tells more in building than in any other line of work. One radiator, of course, would not make much impression on an entire attic, but it could make at least

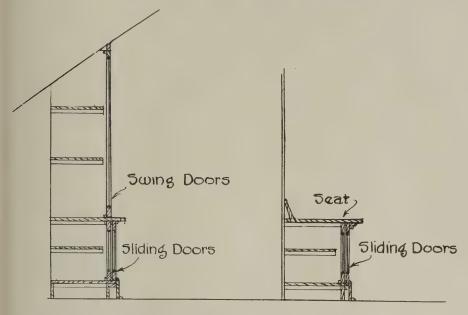
a portion of it fit to play in on chilly days. By doing this, a room planned for a nursery while the children are small, could be used for a bedroom later and the play room moved to the attic.

The unfinished attic with bare rafters and studding may be entirely transformed by the use of wallboard. Wallboard makes an especially desirable wall finish for a play room, as it is not

is bad for the children and bad for the toys.

Sand Box

The sand box is a never-ending source of pleasure to the average child and is an easy thing to provide. The size depends upon the room it is planned for, of course, but a common dimension is three feet by two feet and just high enough to reach the child's waist. Make



Sections of cupboards and window seats as shown in perspective sketch

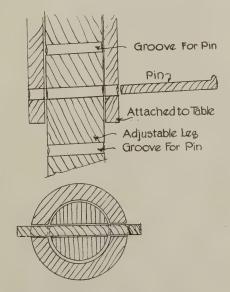
easily broken, and vibrations from swings and so forth are not likely to dislodge it.

If the attic is not out of the question on account of expense its possibilities are almost unlimited. If there is absolutely no place in the house that can be set aside for such a purpose, then a child's bedroom may be furnished in such a way as to make it a satisfactory place in which to play. Here are suggested some built-in furnishings for a well-equipped play room located in either the attic or in the bedroom.

Toy Box

The ideal place for the toy box is under a window, forming a window seat with hinged cover, or better still, with sliding doors across the front. If doors are used, a shelf can be placed under the seat. The window-seat box has an added advantage. All children love to play on a deep window seat, where they can sit down with their toys about them and still be where they can look outdoors. Cupboards might be built on either side of the window or in a convenient corner of the room. The cupboards should be fitted with doors or curtains and with shelves to hold the children's books, games, and more delicate toys. To leave playthings scattered over the floor when they are not in use

it low enough for the smallest child and the larger ones can sit down to it. The legs should be made adjustable so that the child can make patty-cakes in it at two or three years of age, and



Details of adjustable leg for sand box

rivers and mountains when studying geography in school, seven or eight years later. The side boards should be high enough so that sand will not be too easily spilled out on the floor. A five-

inch side with two inches of sand is practical.

Blackboard

Then there is the blackboard. There are few children who do not like to scribble on a wall, a fence or a sidewalk, and it is not always just a perverse desire to "mark up" things; there is satisfaction in the freedom of motion a large surface gives. It is easy to paint a portion of the wall black and frame it in with a narrow strip of moulding. Add a box of chalk and an eraser, and many hours of amusement and, incidentally, training, are provided. A grooved ledge below the blackboard should be wide enough to hold the chalk and eraser.

Swing

If there is room for a swing put one in, by all means. A simple swing may be made with stout rings screwed into the joists or rafters, as the case may be, with a strong rope to hold a chair seat for the little ones or a plain smooth board for the older ones. Sometimes small swings are hung in a doorway. This is a good scheme where the door may be kept open and there is space in the rooms on either side to swing. This can be arranged so that the swing can be unhooked and put away when not in use. A teetertotter is another easily constructed toy that delights the littler ones.

An attic can be furnished with all sorts of athletic devices, a punching bag, swinging bars, etc., even a stationary rowing machine is not an extravagance if the children make proper use of it. It provides, the athletic directors tell us, the most perfect exercise. Properly adjusted spring seat and handles are really all that is needed for this. Other paraphernalia will suggest itself.

In General

The play room should be properly ventilated, without direct draughts. Patent window shields are satisfactory for this purpose, especially for window seats.

The floor should be washable, carpet and matting are not satisfactory. Linoleum is probably the best floor covering for this purpose.

Wall paper comes in very gay designs, especially for children's rooms, with stories and rhymes pictured out. If, however, wallboard is used the wall may be painted a soft tint of yellow or rose, and a narrow picture mould run around the room at a height of about 4 feet 6 inches, bright pictures and cards can be placed on it and hung below it, and the children can decorate their own walls to suit themselves.

Points About Interior Trim

By Charles E. White, Jr.

MANY CONTRACTORS do not realize the importance of interior trim—that last touch given to the interior of the house, flat or store building.

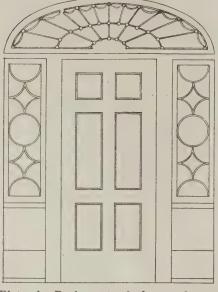


Plate A—Real estate dealers and contractors are discovering that Colonial houses are always popular, so the mills now carry a line of Colonial millwork to keep pace with the demand. This drawing illustrates a very good design for the entrance of a Colonial house

Many do not understand that the building itself is largely judged by the appearance of the trim in the mind of the owner and his friends, who do not





Plate B—Relics of long ago. Glance at this picture of a couple of front doors such as were commonly used a few years ago and are still demanded by some rural customers, and compare these ugly doors with present high-grade design in stock doors

look very far below the surface of paint or varnish when it comes to building construction. If the trim is well made and of good design, the building is, to the average layman, a success.

No reliable builder would think of advocating poor construction, but it can be truthfully said that many a poor building has been camouflaged underneath a coating of good looking interior finish. If you must cheapen the building somewhere, do it elsewhere than in the interior trim, for the latter is often almost the sole visible part of the building that is looked at critically by owners or tenants.

The designing and building of interior woodwork has come to be a profession in itself far removed from the old processes of twenty-five years ago, when every carpenter was not only able to draw plans and specifications for his own doors, casings, window frames and cabinets, but build them as well. Handwork was the standard by which all work was done in those days because labor was cheap and material could be had for a song.

Nothing like that goes in these modern, strenuous times, in which competition is so keen that, often, just a few cents' variation in the cost of a door or sash spells the difference between winning or losing a valuable contract.

With labor cost so high that even experts wonder how owners can continue to pay the price, every advantage must be taken of new improved methods of manufacturing each item in the building derived from wood in order that the mechanic may be given millwork as near a finished product as is possible or practicable. With carpenters getting \$1 per hour in the city and its suburbs, and nearly as much in rural districts, it behooves the contractor who is wise enough to know his best interests to purchase interior finish that goes together with the minimum amount of labor at the job. The more completely a gang of carpenters can be kept hammering and sawing, and the less time they are obliged to put in selecting and assembling, the quicker the job will be done, and the greater the profit.

The millman, in organizing his big interior finish plant, has concluded, and rightly so, that it is up to him to reduce costs for the contractor, and incidentally for the ultimate consumer—the owner. He reached this opinion just before the war and evidences of the new order of

things in millwork was apparent upon scanning the organizations of some of the big interior woodwork factories scattered liberally over the country.

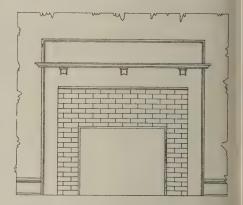


Plate C—Brick mantel, suitable for a small living room, dining room or bedroom. The woodwork in such a design consists merely of a shelf and facing, so cost is reduced to its lowest terms

During the war, the stern necessity of governmental needs, which put every man on his honor to do his bit, a demand which was so ably met by the response of the millmen of the entire country, required the utmost conservation in labor and material. This ideal was steadfastly developed and Uncle Sam got his goods when he wanted them, though army officers, themselves, said it couldn't be done. But it was done, and this same energy built up for purposes of war is now available for the reconstruction period, a time which it is predicted will far surpass any former reconstruction period in the history of the world, and

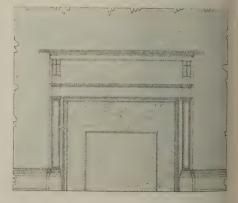
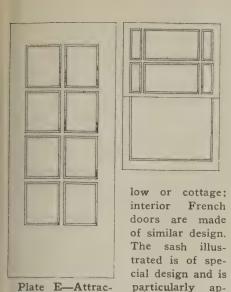


Plate D—Colonial mantel of the better sort, now so popular in houses where such a style is suitable. Many manufacturers of millwork undertake to handle a line of ready-made mantels in stock sizes so that fireplaces can be built to fit them



which will be, according to experts, in full swing in 1920.

tive type of front

door for a bunga-

particularly ap-

propriate for

bungalows

To keep their organizations intact,



Plate F-A simple door which is very inexpensive is shown here, and its chief alue is that it presents a quaint and nusual effect with its two vertical panls; yet it can be had in stock from many mills

though work slumped and almost stopped in the few months just following the armistice, mill owners continued to make up a stock of doors, sash and interior trim. Fortunate it was for the world that they did so, as much time was saved when the spring of 1919 came, and with it the sudden demand for renewed activities in the building line. Though it only took a few weeks to clean out this stock, manufacturers were able to increase their output to the point where they could take care of the new and tremendous demand with a fair degree of success.

At the present time the mills of the country are running to full capacity building up a stock of goods for the business of 1920 so that when the first days of the spring rush strike them, contractors will know where to turn to get their mill goods with the least possible delav.

these mills now carry in stock everything needful in the way of entrance doors, side lights, interior doors, sash, blinds and shutters, as well as correct cornice moldings.

Plate A illustrates a correct design for a Colonial front door and side lights. Colonial doors can be purchased in several different styles, containing from one to eight panels, arranged in the same manner as old houses built in the South and East, examples which have been admired by architects for many years, and which serve as a basis of most of the present-day Colonial design.

Although the illustration shows side lights containing wood muntins many of the prettiest designs for side lights are made of metal-bar glass. The latter has an advantage over wood muntins in that scrolls can be made much smaller and of more intricate pattern. Most millworking houses have an ornamental

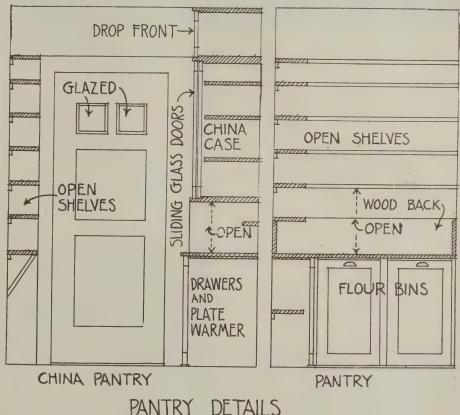


Plate G-Drawing showing details of pantry cases. Mills now carry in stock a generous line of ready-made pantry and kitchen cases suitable for any home

Practically every type of sash and doors is now carried in stock by manufacturers and it is no longer necessary for architects or builders to design special woodwork of any character, though every mill has a department for special work and much of the finest made-toorder interior woodwork used in houses, apartments, office buildings and hotels is now made in the big mills.

"Colonial" has come to be a popular style for houses and other buildings, and

glass department capable of working out any pattern in metal-bar or other form of ornamental glass, and they are prepared to quote prices on complete goods. including the glass.

As an example of the kind of front doors which mills formerly sold to contractors view Plate B, which indicates the last word in ugly design. Naturally, interior finish dealers carry the line of goods their customers demand, so you need not be surprised to find some houses



Plate H—Interior finish in a modern living room showing the architectural effect of ceiling beams and continuous trim

are still built with ugly front doors and interior trim. Manufacturers discourage this work, however, and are eager to supply material built along correct architectural lines. It is up to contractors to inform themselves on what is good in modern woodwork, and select sash, doors and interior trim which is of the best design.

The designing of mantels has come to be an art in itself, and many mills carry in stock a complete line of mantels designed to cover all architectural styles. Contractors in selecting patterns should remember that the United States is undergoing a revival in what is known as "period" furniture; that is, popular taste has been educated to the point where it appreciates old-fashioned furniture of the various periods preceding the Civil War, and even as far back as the period just before the landing of the Pilgrims in Massachusetts. Modern adaptations of tables and chairs, based on old designs, are to be seen everywhere, and this feeling for period furniture is similar to a prevailing tendency toward "period" architecture; that is, houses designed along the lines of houses which were built in different periods of history, Colonial, Early English, Elizabethan and other well-known architectural styles.

The mantel is not a piece of furniture, but, rather, a bit of built-in cabinetwork which should reflect the architectural style of the house. Manufacturers of modern mantels, recognizing this point, provide stock designs well qualified for this purpose.

Plate C illustrates the simplest possible type of mantel in which the woodwork consists merely of a shelf with a molded edge and a facing. Such a design is suitable for a small living or dining-room, or for a bedroom. As an example of a Colonial mantel, examine Plate D, in which two pilasters and a shelf with carved or embossed edge form the principle basis of the design. Mantels like this present a very rich appear-

ance when completed, though their cost is very modest.

French doors have come into popular use, largely in the last five or six years, and standard designs can be purchased for both inside and outside doors. For the opening between a hall and the livingroom or dining-room, it is now customary to use two sets of fourfold French doors (four separate doors hinged in pairs). French doors are also required for porches and sleeping porches and in many of the most modern homes the front door is similar in design, as is illustrated in Plate E. Sash of stock design are made in 6 and 8-light designs: the unusual arrangement of muntins shown in Plate E is special; these sash are not carried in stock by dealers.

An increased tendency in sash of stock patterns is now toward small panes, though all mills carry in stock windows of various sizes having single lights and two-lights. The dimensions of stock sash are based upon stock sizes of glass so that the glass need not be cut to fit, as is often necessary in sash of special design. At the present high price of glazing, the cutting of glass is quite an item, and this labor cost should be eliminated so far as possible.

If architects can eliminate special work in their pantry cases they will find considerable money may be saved. Pantry and kitchen cases of all sizes and designs are carried in stock, and it is really getting to be the custom now to build the house around the pantry cases. In other words, when drawing plans for a house, it is very little trouble to ascer-



Plate I—Beams and pilasters give this room a dignified appearance that is quite desirable for large rooms with a high ceiling. Mills are equipped to furnish interior work of this pattern just as well as trim having more ordinary lines

tain the dimensions of pantry cases of standard design, and plan for these cases instead of requiring mills to make special cases to fit the house.

Bath tubs and wash bowls are not made to order and must be planned for in the original working drawings, so why not pantry and kitchen cases, sideboards and bookcases? The catalogs of manufacturers are very complete and the number of designs of sash, doors, sideboards and cases very large so that any one may find, in stock designs, cabinets that will fit practically all places at a fraction of the cost of special cabinet work.

Plate H shows the rich effect of simple bands of wood applied to the ceiling and the living-room illustrated indicates a mode of architectural treatment very concern having furnished all the woodwork for this home. The wood for the panelled wainscot was specially selected for grain and color and the compound door illustrated was veneered to match the other woodwork.

Before closing the contract for a house or other structure, contractors should show their catalogs of interior finish to the owner, so that he can select well in advance the kind of interior finish he desires. In most cases the mill is located at considerable distance from the building, and it is better to get the order placed a long time in advance to avoid delay in delivery. This is one of the advantages of stock designs in millwork, that the delay required by special work is eliminated. As there are now such a wide range of excellent designs to



Plate J—The millwork of this home was made to order by one of the big national woodworking concerns. The room is in quartered white oak, specially selected for grain and color. The sideboard has metal-bar glass doors

popular, especially in the West, in which what is known as "continuous trim" is employed. That is, the head casing over doors and windows is continued around the entire room and forms a frieze. No special detail is required for woodwork of this character, as all mills carry plain casing and simple moldings suitable for back-bands and picture moldings.

The pilaster and beam treatment of the room illustrated in Plate I indicates how dignified such a room may be when the millwork is carefully selected. For rooms with a lofty ceiling upwards of ten feet high this is a very good way to trim and most of the big mills have suitable interior trim of this character.

Plate J shows a special sideboard built to order by one of the large, middlewestern interior finish mills, the same choose from there is no longer the incentive for special designs that was true a few years ago when ready-made millwork was not on such a high plane as it is today.

A Specialist in Fireplaces

A few years ago R. N. Rider was superintendent of construction for a firm in Pittsburgh. Time and again he had seen fireplaces built, torn down, and rebuilt. He began to study how to stop this economic waste. So for a long time he studied fireplaces. Studied them from both sides—construction and design. He searched the libraries for works on fireplaces and filed all the current literature on the subject, comparing and sifting the various ideas illustrated and described.



R. N. Rider, specialist in fireplaces

Based on a broad and sound general knowledge of building, he concentrated on acquiring a very special knowledge about fireplaces. Every fireplace built by his firm was studied by him—its excellences noted, as well as points that could be improved.

When Mr. Rider became a partner in the firm of Miller & Rider, Altoona, brick mason contractors, his work was still that of supervising construction, and his attention was even more concentrated on fireplaces. His excellence in this field soon became noticed; consultations were sought with him, and later other builders sublet that part of the job to this "man who knew how."

So rapidly has Mr. Rider's reputation spread that practically all his time is now occupied in constructing fireplaces.

Around Altoona, nearly all fireplaces are built with brick facings, and Mr.



One of R. N. Rider's fireplaces

Rider has thoroughly developed that type—though no two of his fireplaces are alike in design. Each fireplace is made to suit the room and that suitability is carefully studied out, in scale and color. Very few are built from drawings; most of them are worked out in the material itself—brick by brick.

Thus it has come about that if any Altoona man who is building a home and in discussing details is asked about the fireplace, he will say: "I am leaving that to Rider."

While Mr. Rider has gone thoroughly into brick fireplace construction he has devoted attention to all the kinds of material entering into this class of work.

It is Mr. Rider's intention to break away from the brick masonry business and devote his entire attention to fire-place design and construction in all styles.



Another style

A Slip

Some builders spend a great deal of time and money in an effort to produce a first-class job, only to have their good intentions defeated by inattention to details. Good materials, although they play thing wrong, he should not be merely bawled out, but should be told why his method is wrong. An explanation may take several minutes, but it will save time in the long run, and instead of antagoniz-



Watch the water supply or you will have a poor mix

a large part, will not alone produce a satisfactory result. The workmanship must also be good. Not only good to look at, but good to the core; with as much attention paid to their structural worth as to their appearance.

Of course, it is not practicable for the average builder, or his foreman, to personally supervise every operation on a job, but he should constantly impress upon his workmen that they are largely responsible for the success of a job. When a workman is discovered doing a

ing the workman it will increase his good will and increase his general worth.

Every issue of NATIONAL BUILDER contains many hints that should be passed on to the men on the job. One builder goes so far as to go through his copy every month and select portions of articles that he feels are valuable for his workmen.

These selections are then typewritten and distributed to the men. This builder claims a noticeable increase in the interest and efficiency of his force.

The accompanying photograph illustrates one of those little slips that are so often responsible for a whole job being condemned. When this mixer was shut down, after a run of concrete, the operator neglected to turn off the water supply. Concrete, which had collected in the end of the wooden trough under the mixer spout, formed a dam which held the water to a level of 3 or 4 inches in the trough. This surplus water was not removed before the mixer was again started and the result was a very sloppy batch that allowed the aggregate to separate when the concrete was dumped into the forms. The result was probably a porous streak which dampness may easily penetrate. This may be the only porous streak in the entire job, yet it may be the basis of the owner saying that the builder gave him a leaky basement. We all know that in an owner's estimation, a damp basement is the greatest crime that can he committed.

Cut Nails vs. Wire Nails

J. J. K. asks for a comparison of cut nails and wire nails for use in building construction.

Cut nails are cut or stamped from sheets of steel or iron by means of machinery, thus they are rectangular in section. Wire nails are made from steel wire, which is also headed and pointed by machinery. Wire nails for domestic use are almost always drawn round in section, but for export purposes they are also made in oval, rectangular and diamond shapes.

Cut nails made of iron are considered more durable for exposed locations than are those made of steel. In general, the classifications of cut nails are similar to those for cut ones, viz.: common, finish, and casing.

Wire nails are usually preferred by carpenters, as they drive easier, are not so likely to bend or break, nor to split the wood. On the other hand, cut nails have more holding power than wire nails and where warping of lumber or other unusual strains are to be provided for, it is well to use cut nails. A U. S. arsenal test covering separate tests on forty different sizes of nails driven in spruce, gave the cut nails an average holding power that was more than 60 per cent greater than was that for wire nails.

On account of their superior qualities of durability and holding power, cut nails are again coming back into general use.

While on the subject of nails, it may be of interest to note that the name "penny" used in designating the size of nails, arose from an old English trade custom which denoted the number of pennies to be paid for 100 nails. For instance, 10 pennies (abbreviated 10d.) would buy 100 "ten-penny" nails.

ENTRANCES

The Examples Shown Hereunder and in Each Issue of National Builder Will Aid in Suggesting an Appropriate Entrance Design



No. 1—An entrance in the Colonial style. Its position under the large porch renders elaboration unnecessary, and the simple architecture and the fan-light give just the right feeling



No. 3—An entrance for a bungalow. This one is also Colonial in feeling, but is not so true to type as are the first two. It forms a simple and appropriate entrance for the small house



No. 5—The house is modern English in style and the entrance is very appropriate. The stucco is white; the woodwork stained dark brown, almost black; and walk and steps are red brick and cement.



No. 2—Another Colonial type; very dignified, yet full of charm and home feeling. White woodwork against red brick is always effective, and the iron balcony adds to the attractiveness



No. 4—It isn't fair to show this one now, as it isn't completed, but use your imagination and you can picture an attractive entrance. The projecting bay makes use of heavy columns logical.



No. 6—This entrance is also English in feeling and is formed of white woodwork and gray stucco. The projecting vestibule type is quite popular in cold climates

Stone as a Building Material

By John Y. Dunlop

NEVER before has any greater attention been paid to building materials, for it has come home to all classes that this is a matter which affects both rich and poor alike, and that unless all of those whose business it is to produce building material get set agoing at once, we shall soon be suffering from a greater shortage than at present.

Quarry masters, whose occupation and livelihood have been dependent on the

No one, with any experience of the building trade, would think for a moment that the formation of a stone opening could be done so cheap as the building of brick sides and lintel of a window. But this I do know, that taking a large area of stone wallings of a good type and, if compared with a brick wall of good stock brick, the difference in cost was not worth considering.

Why then has this class of work dis-



Church built with granite

production of stone, have not been fortunate in getting the ear of the public, with the result that they have been watching and waiting and surveying with certain misgivings the indifference which seems to have so far been displayed toward their contribution to the production of building material which they are willing and anxious to make.

There is no lack of good sandstone or limestone in England and experts still tell us that stone has never been surpassed as a building material. In the stone districts, previous to the war, one would not have dared to suggest to build a house with another material. Even the smallest cottage had its stone front and gables and the stone chimney was one of the crowning features of the way-side cottage in those districts.

appeared so completely from among a class of builders who were so much wrapped up in it previous to the war?

This great industry is one of the oldest in our own country and to those of the trade who have visited the Old Country, the splendid stone buildings which have been seen, give evidence that stone in the building of our houses and other buildings has always been an important material. It is an industry which has employed thousands of workmen and trained hundreds of apprentices every year.

The principal stones which were quarried in Britain before the war were granites, marbles, limestones and sandstones. Other kinds of stone were used in the construction of walls, but only in the immediate neighborhood of the

quarry. The use of granite in building except in the neighborhood of the quarry, is almost restricted to ornamental features.

Limestones and sandstone are the principal building stones used in the British Isles. Marbles are used for ornamental purposes, as the best varieties are too expensive for general construction.

The example shown of the granite church is from the Aberdeen district in the North of Scotland, where the famous Rubislaw and Peterhead granite quarries are located.

Stone walling, whether of sandstone, limestone or granite, is named according to the shape and finish of the material. The principal kinds are rubble, square rubble and ashlar, and each of these have several subdivisions.

The strength and imperviousness of masonry walls depend very much on the quality of the mortar used. If the mortar is not good a wall is bound to be more or less unsatisfactory.

Flints and igneous rocks are exceedingly dense, non-absorbent and practically proof against atmospheric attack.

Uncoursed rubble, with hammer dressed joints, is generally known as rustic work. Frequently rubble walls are finished externally with stucco. The stones on the exposed angles of the walls are usually made to project and the stucco work finishing flush with the stone, thus forming a quoin effect.

Square rubble gives a better and neater kind of work than random rubble. Sandstone lends itself very readily to this treatment.

In most of the well-known sandstone quarries the rock splits naturally into slabs from 6 inches to 7 inches thick, and the slabs are then cut to the required breadth, usually 6 inches. The quarry companies prepare the stones ready for building in two ways; with a face which is machined fairly smooth, or rock-faced, which is left with rough projections, but has the joints pitched to a line formed with the hammer and pitching tool or chisel. The rock-faced stone wall is usually more expensive than the other.

With snecked rubble there is a great variety of stones having different depths, thus breaking the horizontal courses into short lengths. The small stone at the end of a course is known as the sneck, and the stone with the deepest face is

known as the riser. Often the risers are specified to be of 11 inches or 12 inches, which means, then, that the courses used in that particular job will be 5 inches and 6 inches, or 5 inches and

Ashlar stone walls are usually built with freestone. That is, any class of stone which works freely under the tools. The different kinds of finish given to ashlar stone walls on the face may vary from rough rock-faced to the finest tooled and the smoothest rubbed.

The vertical joints of hand-wrought ashlar stones are very often scamped on the back. That is, they are seldom squared back far enough, which often leads to damp' walls. Bed joints are known to have been wrought in the same way, which may lead to the cracking of stones, due to the weight being concentrated on the edges instead of over the whole bed.

Our early builders were sorely tried in their attempts to build dry walls of porous material, and in districts where the west winds were so fierce that the trees took a permanent set to the east, the difficulty was great.

The sandstones, although hard and durable, are undoubtedly porous. So porous sometimes that rain is driven through the stones, and bubbles come out and trickle down the back of the stone.

The usual defects in the construction



Church built with limestone



Church built with sandstone

A Knowledge of Woods

KNOWLEDGE of woods and their A peculiar suitability for special purposes is not only a valuable possession

methods of treating their particular spe-

Wise builders should possess these aids, study them and keep them on their reference files. These are the days for the studious, reading, builder to make himself a name.

To no other material is given the wide range of qualities found in wood; it is strong and comparatively light; is easily framed, and a good non-conductor of heat. For decorative purposes it furnishes a wide variety of color and grain effects; its natural grain forms designs which are always harmonious but never set, and its possibilities for varied treatment are unlimited.

The wide variation and physical qualities of the different species gives us a wood for every use. A weight of three hundred pounds will imbed a one-half inch ball half its diameter in some woods, while for some others more than a ton and a half would be required. Woods that will withstand a direct pull of two and one-half tons per square inch are common, while some will run as high as thirteen thousand pounds or more. Four wood columns, twelve inches square and fifteen feet long, will carry a load of half a million pounds. Three men can easily carry a 16"x16" column, ten feet long, and this column would readily support the weight of a modern freight locomotive. Woods are found weighing as low as twenty pounds per cubic foot, while others run as high as sixty.

Wood is also one of the best non-conducting materials used in a structural capacity. Its cellular and fibrous structure form a barrier to the passage of heat, which is not found in heavier and more dense materials. This characteristic saves it from condensing moisture and "dampness." It is not offensive to the touch in hot or cold weather, and hence its wide use in making furniture and as a flooring material. Its resistance to the action of weak acids and alkali makes it very useful in the construction of vats and tanks since it is not liable to taint foods and liquids.

It took the war to focus our attention on the fact that delay in construction is a thing almost unknown to wood. The very rapid erection of our military camps and cantonments is a very powerful testimony to the speed with which buildings of this material may be erected. Within ninety days from the time the contracts were let for some of the largest cantonments, thousands of troops were pouring into them and thus it was wood that won the first big battle in the war. Furthermore, it furnished the material for quickly constructed defenses and for bridges necessary in bringing materials and ammunition up to the boys on the firing line. Our boys recently surprised the Germans by throwing a bridge across the Rhine in forty-four minutes.

As a finishing material, the use of wood is almost universal. Its wide variety of grains and its many soft and harmonious tones and pleasing textures make possible the large number of pleasing effects that are found in the field of wood finishing decoration. Wood may be cut for special decorative qualities, such as quarter-sawed oak or bird's eye maple. It may be used as a decoration because of surface effects alone, or it may easily be shaped into refined mouldings and carved inot delicate ornaments.

However, the greatest field for usefulness for wood is as a structural material. Modern development of machinery and equipment is so rapid that very few factory and commercial buildings attain an age of a quarter of a century without being entirely rebuilt, and remodeling is usually a necessity every few years. The mill construction type of building readily meets these conditions. It is not only cheaper in first cost, but changes and alterations are made readily with this type of construction. Structural timber used in this kind of building is often reframed and used again and again. In structural use, timber is not only light, strong and easily framed, but its toughness and elasticity make the sudden failure of beams and joists rare. It is used where sudden loads and shocks are frequent, and not only absorbs the shock, but also the noise which might become very annoying.

For bridge and factory floors, as well

as for stockyards, stables, garages, rail-way stations and the like, wood blocks make a light, quiet, comfortable floor, which "stands the gaff" like a butcher's block. It is not cold to stand upon, is comparatively noiseless and readily repaired when necessary. It has been tried out as a flooring material for baggage cars recently. Its long life under the severe conditions and requirements of this service has proved its value for that purpose.

The introduction of modern methods of wood preservation have opened up a new and wide field for the use of wood. To other desirable qualities of wood, it has added a resistance to the attack of moisture and other destructive agencies, which have heretofore made the selection of a proper material difficult. When used for tanks and flumes, it resists the action of frost and water and allows repairs to be easily and quickly made.

Wood also has the advantage of a very wide availability. Wood for building

purposes can be procured in almost every city, town and village in the country and in sizes which are most commonly used in the erection of buildings. Further than this, men are to be found everywhere who are familiar with its use, and can quickly and properly handle the erection of a frame building.

With all the qualities which wood brings into the service of man, its cost is low. The processes of manufacture and distribution have been the subject of careful study and economical administration. The demands of the great war on the industries and the constantly rising level of prices, have affected lumber the least of any of the important building materials. The rise in the general level of materials and also the wages of workmen, have been so rapid in comparison with lumber that thousands who never before could afford to build, are now in a position to build for themselves cozy homes, which will bring them content and happiness.

A Fire Test of Protected and Unprotected Frame Walls

An interesting test of fire resistive frame construction, made during Fire Prevention Week at St. Paul, Minn., goes to prove that wood constructed buildings can be successfully fireproofed.



Fig. 1-Ready for the fire test

With the co-operation of George H. Nettleton, state fire marshal of Minnesota, a small test house was built of ordinary construction with wood studs and wood rafters. Half the lumber of this test house was protected with metal lath and plaster inside and metal lath and stucco outside. The projecting rafters, also, were protected by metal lath and stucco, and incombustible shingles were put upon the roof.

The studs on the other side of the test house were covered with ordinary lath and plaster on the inside and drop siding on the outside. The rafters were covered with wood shingles.

A division partition was inserted between the two halves of the house. This partition was constructed of wood studs protected on both sides by metal lath and plaster.

The back of the house was constructed of wood siding, end to end; no stucco



Fig. 2—The roof burned through in forty-five minutes

being used. The idea was to illustrate how impossible it was for a fire that might start on the inside of a frame house to get into the exterior wall and consume the drop siding, if the inside of the exterior wall is protected by metal lath. See Fig. 1.

The firewood to start the fire test was divided into four equal parts, one pile to be used inside and one outside of both halves of the house.

The fire was started on the metal lath and plastered side first, so that no advantage might be given to it. In six minutes smoke issued through the ordinary shingles on the unprotected side, and in thirteen minutes the wood siding



Fig. 3—Fire leaves protected wood construction practically intact

had been completely burned through behind the starting fire, allowing the fire to enter the hollow space. Fourteen minutes only were required to disintegrate the plaster on the ordinary lath and extend the fire to the interior of the wall. The roof burned through in forty-three minutes. See Fig. 2.

During this time the fires previously started in the metal lath protected half burned themselves out against the walls. Examination showed that the metal lath had held the plaster coating intact and reinforced it against cracks developing on the other side of the house.

In three hours and ten minutes the smoldering embers were extinguished, leaving the protected wood construction practically intact. See Fig. 3.

Do not hastily blame material, but be sure that you have used it as it should be used.

Temporary Support for Beams

It is well known that a "green" masonry wall is heavier than one which is dry. Where a wall is supported on a steel beam of long span it is good practice to insert a temporary support near the center of the beam until the excess moisture has dried out of the wall. This



Temporary support for a "green" wall

will often prevent the formation of unsightly cracks in the wall caused by excessive deflection of the beam. In the illustration the temporary support consists of an 8x8 post resting on a small jack screw.

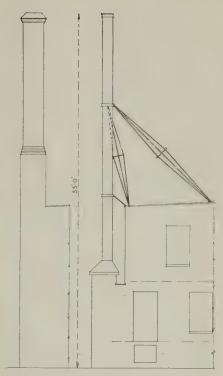
Economy of Brick Construction

An interesting contrast in the cost of material and construction is given in a recent instance wherein comparative bids for brick and steel construction for a chimney stack were taken in September by Olsen & Urbain, architects, of Chicago. The chimney is to be erected for the Jersey Dairy Company, of Gary, Ind., the home of steel manufacture—nevertheless, brick won out.

An outline sketch of the two styles of construction specified is shown herewith. The steel stack was required to be 20 inches in diameter and of No. 12 gauge steel with rigid trussed supports.

The brick stack has a flue area of 20 inches square, giving a larger flue area than the steel stack.

The cost of the steel stack was \$580,



Sketch of brick and of steel specifications for chimney

with \$30 added for painting, while the brick stack, with its advantage of a larger flue area and more sightly appearance, is to be built for \$500.

Roof Elevations

By the "pitch" of a roof is meant the relation which the height of the ridge above the level of the roof-plates bears to the span, or the distance between the studs on which the roof rests.

The length of rafters for the most common pitches can be found as follows, from any given span:

If ¼ pitch, multiply span by .559 or 7/12 nearly.

If $\frac{1}{3}$ pitch, multiply span by .6 or $\frac{3}{5}$ nearly.

If $\frac{2}{3}$ pitch, multiply span by .625 or $\frac{5}{8}$ nearly.

If ½ pitch, multiply span by .71 or 7/10 nearly.

If 5% pitch, multiply span by .8 or 4% nearly.

If full pitch, multiply span by 1/12 or 1.18 nearly.

To length thus obtained must be added amount of projections of rafters at the

As rafters must be purchased of even lengths, a few inches more or less on their lengths will make a difference to the pitch so slight that it cannot be detected by the eye.

Example—To determine the length of rafters for a roof constructed one-half pitch, with a span of 24 feet: 24×.71=17.04, or, practically, just 17 feet. A projection of one foot for eaves makes the length to be purchased 18 feet.

A White City

A LMOST every community has some pet method or material that is used more extensively than others. These local favorites have become so familiar

to the citizens of the community that their use often becomes more or less second nature. To a stranger, however, they often present a quality of origin-

ality that serves to mark the community from its neighbors.

The individuality of Clinton, Iowa, is probably best expressed by the striking





Fig. 1

Fig. 2

Fig. 1—Buildings like this one are trade-pullers. Incidentally they are mighty good advertising for the builder. Fig. 2—A garage faced with white enameled brick and terra cotta trimmings. The trimmings are white with very dark green patterns



Fig. 3

Fig. 3—Three in a row. Note the contrast between the old buildings and spic-and-span appearance of the modern ones.



Fig. 4

Fig. 4—This man is capitalizing his white store-front. The interior finish is also "snow-white"

number of its business buildings that are built of white terra cotta and white enameled brick.

The extent of the use of these materials is by no means fully expressed by the few buildings shown in the accompanying photographs. These subjects were selected at random, with the idea of illustrating the general impression that is made by the streets.

The contrast between the intense whiteness of these buildings and the rather gloomy appearance of their older neighbors is not only superficial. It is no doubt reflected in higher rentals for the owners and in greater sales for the

In many cases the buildings are entirely new. In other cases only the fronts have been remodeled. One of the photographs shows a building with a new white enameled brick and terra cotta front, while the remainder of the building was stuccoed. It is reasonably safe to predict that before many years have passed the majority of the old buildings in the town will have received a similar treatment. Remodeling work of this character is comparatively inexpensive and by replacing the heavy supports with cast iron and steel; putting in modern show windows and refacing the front, the entire appearance can be changed.

Builders will realize the value of the publicity which came to the firms that put up these buildings. In fact, it is probably safe to say that one builder was responsible for the majority of them. It is almost always so; a man introduces a new material or method to a community and if it makes a hit, he is swamped with work and gets the lion's share of the future business.

This is why it is so important for a builder to keep his eyes and ears open with regard to the new developments in his line of work. He should make every effort to be the first man to introduce up-to-date building ideas to his community. The fact that he was first in the field will give him an advantage that will handicap his competitors. All of the advantage does not rest here, however, but also consists in the reputation for progressiveness which the builder obtains. He should, on the other hand, always realize that his competitors may at any time turn the tables on him and that he cannot afford to become a slave to any one material or method. Things that are new this year may be "old stuff" next.

The "Reading" Builder

The times are encouraging all sorts of new methods and the use of substitute materials. The "reading builder" keeps posted on these and can give intelligent advice on their merits.

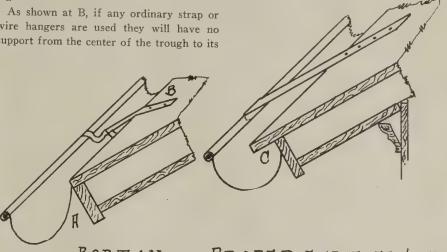
The "Bobtailed" Eave

A provoking because easily avoided practice in bad workmanship is shown in the drawing herewith, illustrating the "bobtail" and proper eave finish. By the "bobtail" method the sheathing is allowed no projection whatever, and the rainwater will therefore often flood down the fascia. In addition to this, the wind frequently drives the water back against the building, causing leaks.

wire hangers are used they will have no support from the center of the trough to its of the metal would again break the raw edge loose, and leave the job as bad, if not worse, than before.

Contractors and owners of buildings do not give enough attention to these apparently minor matters, and leave themselves open to the repeated expense and annoyance caused by the imperfect workmanship of a thoughtless mechanic.

The drawing illustrates a practical



BOBTAIL VS. PROPER EAVE FINISH

back edge. This will cause the weight of accumulated snow and ice in winter weather to break down the trough by bending the hanger, as shown. Should a tin roof cover the building and the edge be allowed to project over the edge of sheathing and extend itself out into the trough, this would be a bungling arrangement and would not get all the drip into the trough nor strengthen the hangers.

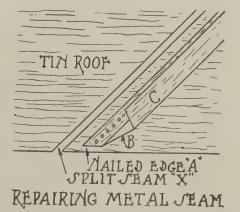
A proper projection is shown at C, in which the sheathing is allowed to pass forward over the fascia to a distance that will engage half of the eave trough. Thus, if a 6-inch trough is used the projection should be 3 inches. This arrangement will allow half of the trough to extend back under the fascia and the hanger will rest upon the edge of the projecting sheathing, thus reducing the hanger's tendency to bend down and throw the trough out of alignment.-L. S. Bonbrake.

Repairing Metal Roof

In no description of work is the tendency of workmen to move in a rut more clearly shown than in roof-repair work, especially in flat-seamed metal roofs where leaks are caused by cracked or split seams.

I have often tried to discover the lack of reasoning in a mechanic who piles new solder over an old, cracked seam, when he should know that the freezing winter weather causing expansion and contraction

method for repairing metal roof seams. See that the workman has sufficient tin strips prepared at the shop to cover all the cracked or leaky cross seams on the roof. These metal strips or caps should be 1 inch wide and have a 4-inch flange formed on each edge, to be used a hem, as shown at C. The split seam is cleaned of all piled-up solder, and rough places are smoothed. The prepared strip is then closely nailed slightly back of the split seams, as shown at A. The fold B is then turned forward and the hem



C is peened into the split seam, after which it is malleted flat and smooth. Solder is now sweated thoroughly into both edges with a hot soldering iron. There will be no raw edges here to crack loose, hence it will stand the strain of the most severe test.-L. S. Bonbrake.

Awards of Farm House Competition

JUDGES:

B. F. Faast, President Wisconsin Colonization Company, Eau Claire, Wis. F. W. Ives, Professor of Farm Engineering, Ohio State University, Columbus, Ohio

Mrs. F. B. Brownell, Winterset, Iowa.

Mrs. A. J. Edminster, Holcombe, Wis.

A Member of the Editorial Staff of National Builder.

THE farm house competition conducted for the Wisconsin Colonization Company by NATIONAL BUILDER has been adjudicated and the winners selected. The fact that the several judges found it impracticable to meet as a body, but were compelled by circumstances to come to their decisions as individuals was largely responsible for the delay in announcing the results. This fact, however, overcame any tendency for any one judge to unduly influence the opinions of the others, and each judge came to a decision without conferring with his fellow members.

In this manner each design was graded three times, the winners being determined by those designs which received the largest average grade. The judges endeavored to preserve an impartial attitude with respect to draftsmanship, and to base their judgments almost wholly on excellence of plan and of design. They of course realize that none of the designs may be said to be ideal for the purpose for which they are intended, but such excellence is rarely, if ever, found in any building, and to suit the individual requirements of various people is manifestly impossible.

Some competitors violated the provisions of the program by submitting drawings made with ordinary writing ink, instead of with the India ink specified. Others did not adhere to the required sizes for the drawings. In such cases the designs were automatically barred from the competition. In almost every case the costs of the houses are figured too low and it would be quite impossible to build them for the sums named, but in view of the fact that this is true of practically all of the designs, it was decided to overlook this fault. In normal times the given figures would in many cases hold good, but 16 cents per cubic foot is rather low for present building costs, and from 20 to 25 cents per cubic foot would be nearer the actual cost in most parts of the country.

Another criticism is that the competitors did not always consider the prob-

lem as a design for a farm house. Too many of the designs were given over to solutions that are excellent in themselves, but are better suited to town or suburban living conditions than to those which prevail on the average farm. It must be acknowledged, however, that the program was rather hazy in setting forth the requirements that govern the design of farm houses. In view of this fact, and also the extremely low cost limits that were placed on the houses, the competitors are to be complimented on the excellent showing that was made.

\$3,500 Farm House

First prize—H. W. Peebles, 149 Park Ave., Detroit, Mich.

Mr. Peebles submits two exterior treatments for the same plan. The alternate elevations are more appropriate for a farm house than are the ones shown in connection with the plans. The basement is small and the partial elevation results in only a small saving. The first floor is well arranged. There is a separate entrance for hired help which permits the men to enter the house; wash, and reach the dining-room without passing through any other rooms. The office is a practical necessity on an up-to-date farm and it is also accessible without passing through the house. The relation of the kitchen to the basement stairs, the dining-room and the dining porch is good. The wide arch between the living-room and the dining-room allows generous space for meals for extra help during harvest times. The farm hand's room on the first floor is well placed and separated from the remainder of the house. The second-story bedrooms all have cross ventilation and the closets are ample. The plumbing is economically arranged for the piping, and the single central chimney serves all flues. The roofs could be raised slightly to do away with the dormers, thus simplifying the construction and also improving the headroom. It is not likely that this change would increase the cost materially and if properly done the appearance would not suffer. The drawings are well worked out and are attractively presented.

Honorable mention—Albert M. Ruttenberg, 4706 North Winchester Ave., Chicago, Illinois.

This design is too formal in type for a farm house, the criticism applying to both plan and exterior design. It would, however, make a very desirable town or suburban home.

Honorable mention-H. W. Peebles.

The winner of the first prize also submitted another design which is awarded an honorable mention. This house contains many of the desirable features of the first-prize house, but is not so suitable in several respects. The elevations are charming.

The \$1,200 House

First prize—Chas. J. Sullivan, 77 Smith Street, Detroit, Michigan.

A very compact and well-arranged plan. The hired man's room is well placed and the hall allows the help to reach the dining-room without passing through other rooms. It is, however, difficult to imagine a housekeeper who would consent to do without a cellar for a farm house. The elevations are simple and appropriate and the draftsmanship is pleasing.

Honorable mention—Merritt E. Hoffman, Agricultural College, North Dakota.

An ingenious plan that is full of suggestions. An exterior entrance to the hired man's room would be an improvement. The elevations are somewhat bare and uninteresting.

Honorable mention—Victor Thomas, New London, Wisconsin.

A plan that is strikingly similar to that of the first-prize house. A more careful working out of the exterior design to relieve its commonplaceness would probably have resulted in including this house among the prize winners.

The \$500 Cabin

First prize—W. H. Gwin, South Gifford, Missouri.

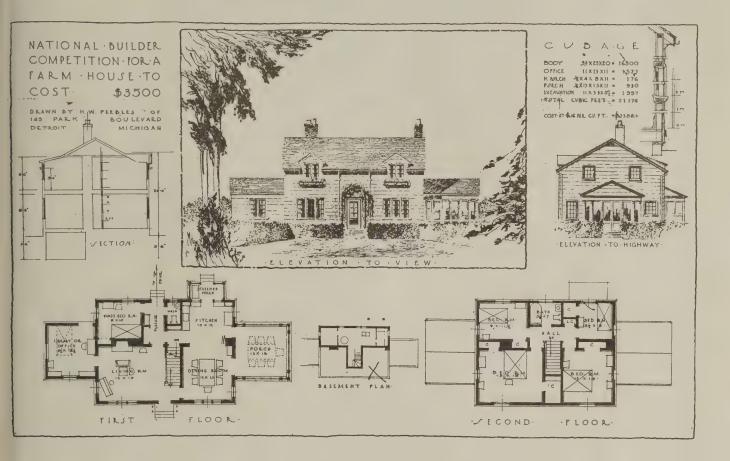
In adding a future addition to this cabin it would not be necessary to rearrange any windows or doors. This fact was largely responsible for its receiving first prize. The plan is simple and would probably be satisfying for the purpose, but the elevations are rather crude and uninteresting.

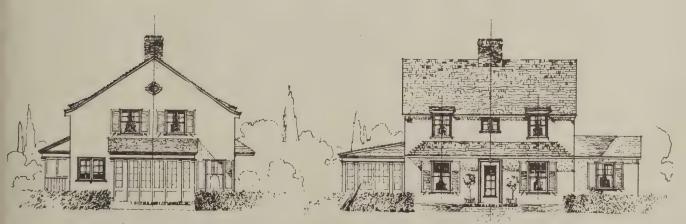
Honorable mention—Designs by Victor Thomas, New London, Wisconsin, and by E. M. Edmunds, Independence, Kansas.

These two designs are not reproduced as they have no features of general interest.

Special mention by the Editor—The design by Mr. Chas. A. Rais, of Westfield, Massachusetts, for a \$500 cabin was not awarded a prize nor honorable mention by the judges, but it is believed that it will prove of interest to our readers.

First Prize for Thirty-five Hundred Dollar House—H. W. Peebles





ELEVATION TO LOAD

ELEVATION TO VIEW

· A.\$3500 · FARM · HOUSE · FOR · THE · NATIONAL · BUILDER · ALTERNATE · ELEVATIONS ·

\$3,500 FARM HOUSE

Specifications submitted by H. W. Peebles, Architectural Draftsman, 149 Park Blvd., Detroit, Mich.

Estimate by cubage-Main part, 271/2x29x21.... Porch (dining) 13x11x10½..... Office, 11x12x11 Porch, kitchen, 41/2 x7 x 111/2..... Excavated part, 13½x29x6..... 2,349 Total cubage (cubic feet)......21,473

Cost at \$0.16 per cubic foot....\$3,435.68

Construction

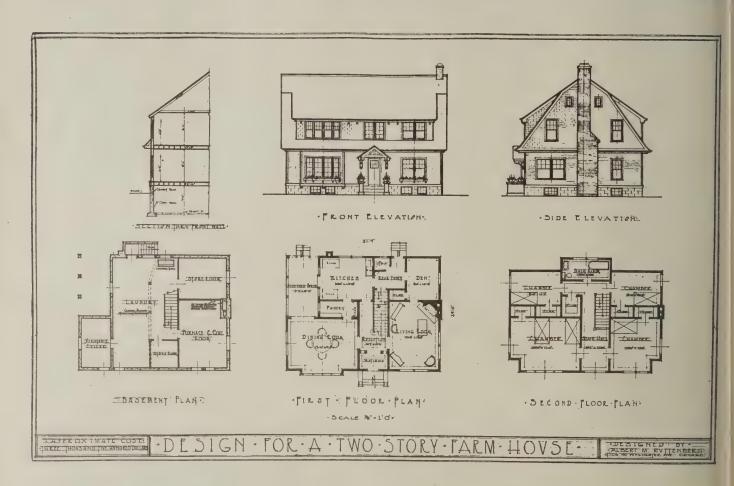
Basement and foundation walls intended to be of poured concrete. Exterior walls above grade to be 2x4s sheathed, papered, furred and stuccoed on wood lath on the exterior. All interior walls to be 2x4s. All walls and ceilings of interiors to be lathed and plastered except those of the basement, which will be board partitions. Roof construction is of 2x4s boarded, papered and shingled, except dining porch and dormers, which will have tinned covers instead of shingles. Basement floor will be of concrete and all other floors of 2x8s with a finished and sub-floor with building paper between the floors.

For finished and rough woodwork southern pine should be the most economical.

Gutters of galvanized iron or wood. Conductors of galvanized iron. Chimney of brick or hollow concrete blocks stuccoed where exposed.

A hot air furnace would be the most economical.

Honorable Mention for Thirty-five Hundred Dollar House—Albert M. Ruttenberg



SPECIFICATIONS BY ALBERT M. RUTTENBERG

4706 N. Winchester Ave., Chicago Cement floor through entire basement. Concrete walls to grade, cement blocks to floor joists.

All studding, hemlock No. 1.

Floor joists, yellow pine.

Maple floors in all rooms except bathroom and toilet, composition floor.

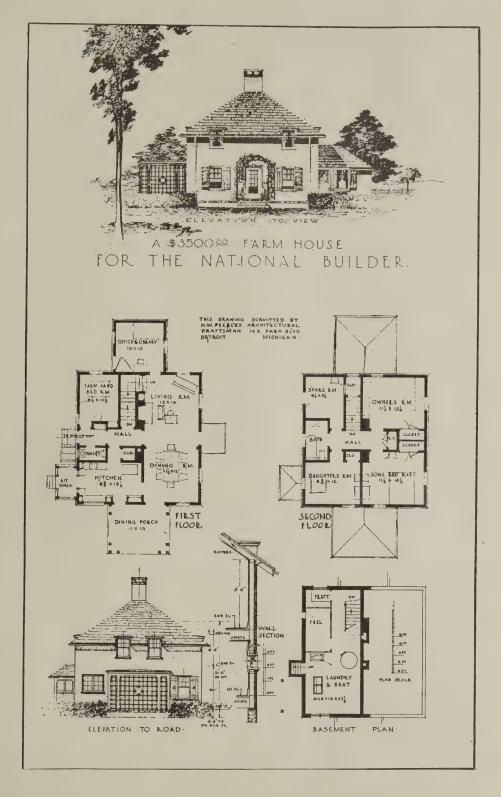
All trim yellow pine, birch doors in vestibule, living room and dining room. Outside of building sheathed and drop siding with paper between.

Excavation\$275.00
Concrete walls 400.00
Cement floor 120.00
Masonry 100.00
Carpentry 1,100.00
Roofing 100.00
Electrical 110.00
Plastering 175.00
Millwork 400.00
Glazing 60.00
Painting 350.00
Heating 175.00

Plumbing		135.00
	\$3	.500.00

The author believes that this farmhouse could be built for about \$3,500 in some localities where there is no great shortage of labor and with material concerns close at hand. The writer doubts whether the stipulated cost would build a farmhouse complete as desired, unless items such as finished hardware, electric fixtures, etc., are not to be considered in this amount.

Honorable Mention for Thirty-five Hundred Dollar House-H. W. Peebles



SPECIFICATIONS BY H. W. PEEBLES

149 Park Blvd., Detroit, Mich.

Basement wall and floor constructed of concrete, 6 inches and 3½ inches respectively, and to be waterproofed. All walls above grade to be of studding. Outside walls are sheathed, papered and

shingled, with courses doubled and exposed about 10 inches to the weather. The roof is to be sheathed, papered and shingled, with courses $4\frac{1}{2}$ inches to the weather.

All interior walls above the basement are to be lathed and plastered.

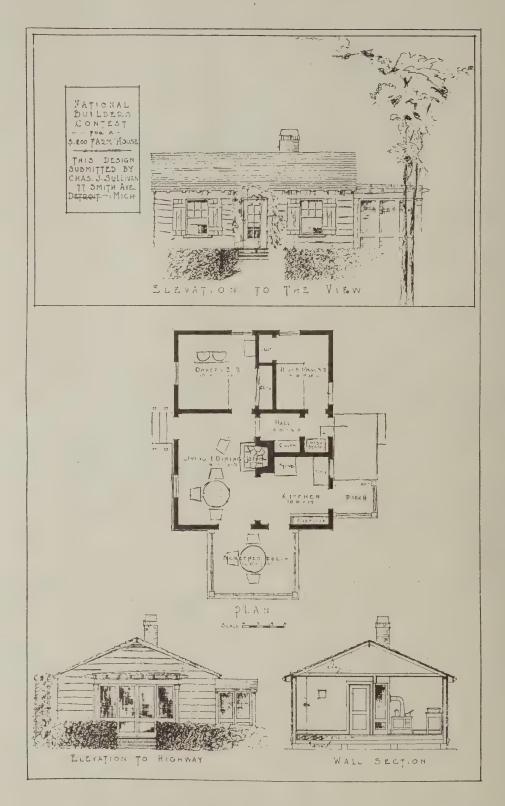
Brick or tile is recommended for chimneys.

Hot air heating would be the most economical.

All floors are to be doubled, with building paper between the rough floor and the finished floor.

All lumber, both rough and finished, should be that as best supplied by the local markets.

First Prize for Twelve Hundred Dollar House—Chas. J. Sullivan



SPECIFICATIONS FOR \$1,200 HOUSE BY CHAS. J. SULLIVAN,

77 Smith St., Detroit, Mich.

Footings or piers to be of concrete or brick. Fireplace and chimney to be of good quality brick.

Exterior walls above grade to be of 2x4 in. studs, %-in. sheathing, building

paper and shingles laid 10-in. to weather.

Interior walls to be lathed and plas-

Roof to be of 2x4s, 7%-in. boarding, building paper and shingles laid 4½ in. to the weather.

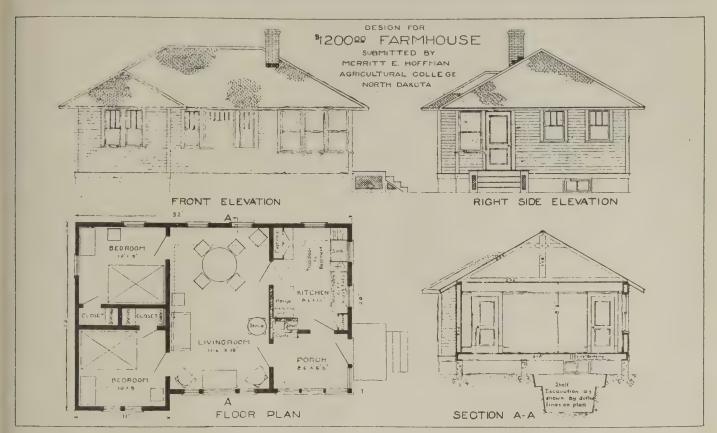
Floors to be of pine or maple.

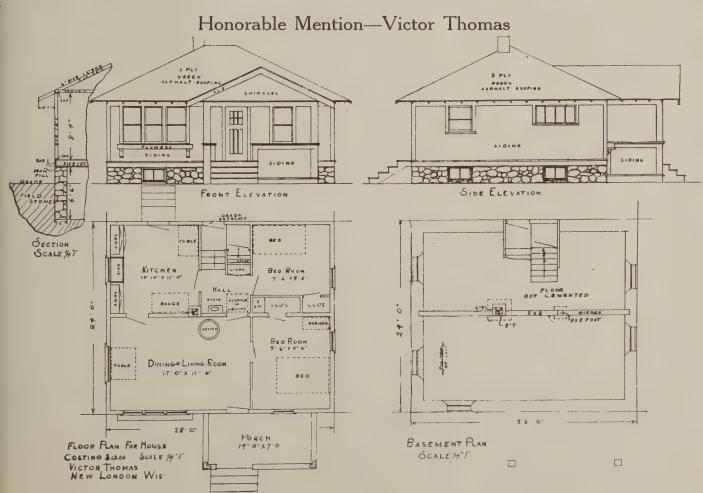
All exterior and interior trim to be of the best supplied by the local market.

Cubage of the House

Total cubage8,912 cubic feet

Honorable Mention for Twelve Hundred Dollar House-Merritt E. Hoffman





NATIONAL BUILDER

BILL OF MATERIALS AND ESTI-MATE, BY MERRITT E. HOFFMAN

Agricultural College, N. Dakota

11611041141 0011060, 11, 2411044
Excavation, 24 yds. @ 60c\$ 14.40
Foundation and footing, 8" thick
10 yds. concrete @ \$5 50.00
Floor joists2"x8"—16' 1200 ft.
Studding2"x4"—16' 1100 ft.
Attic joists2"x6"—16' 620 ft.
Rafters2"x4"-24' 350 ft.
3270 ft.
3,270 ft. No. 1 fir @ 40c per M 130.80
Construction floor,
1" unmatched 750 ft.
Roof sheathing1150 ft.
1900 ft.
1,900 ft. No. 3 hemlock @ 32c M 60.80
Wall sheathing, 6" D. & M.,
1,000 ft. No. 3 pine @ 38c per M 38.00
Siding, 6" D. & M.,
1,200 ft. clear cedar at \$50 per M 60.00
Roof—
1001-

9,000 clear 6-2 shingles @ \$5 M 45.00

(Outside	trim-	-600	ft.	@	\$50	per	${\mathbb M}$	30.00
3	Flooring	g, 4"	edge	gı	air	1,			

Tiooring, I case grain,	
710 ft. yellow pine @ \$45 per M	31.95
Mill work	200.00
Chimney-1075 brick at \$12 per M	12.90
Lath & plaster—270 yds. @ 40c M	108.00
Paint	20.00
Plumbing	25.00
Building paper—5 rolls @ \$3	. 15.00
Insulation of walls,	
300 sq. ft. flaxlinum @ \$2.50 sq.	20.00
Hardware	50.00
Labor	280.00
Total\$1	,190.85

MATERIALS FOR HOUSE COSTING \$1,200, BY VICTOR THOMAS,

New London, Wis.

All piece stuff No. 2 hemlock.
Sheathing, No. 2 hemlock with tarred felt on studs before sheathing is put on.
Siding, No. 1 red cedar.

Roof boards and floor lining, No. 2 hemlock.

Finish floors, No. 1 hard maple 3/8x21/4. Shingles, Extra Star A cedar.

3-ply asphalt roofing.

One coat of pulp plaster and one coat of XXX finish.

Clear yellow pine finish in all rooms on first floor.

Good quality hardware.

Exterior siding and shingles stained one coat.

Inside finish or trim varnished two coats.

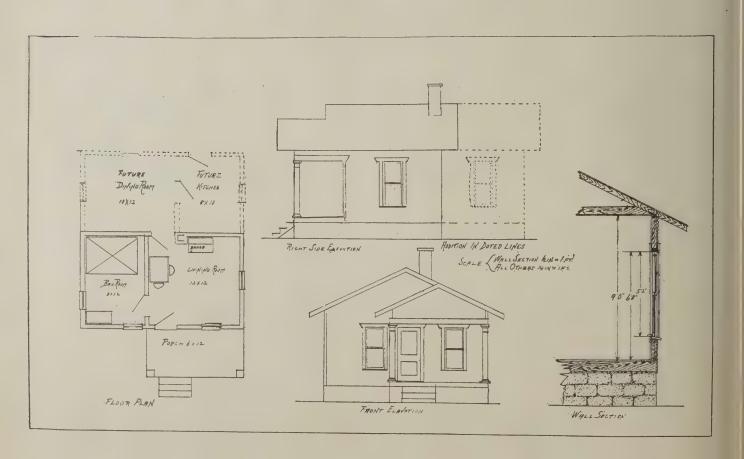
Exterior trim painted two coats, good quality paint.

Detailed Estimate for House Costing \$1,200

Excavating	\$ 25.00
for walls of basement	155.00
Material and labor for plastering	
and chimney	100.00
Rough lumber and millwork	480.00
3-ply roofing	35.00
Hardware, sheathing, paper, etc	65.00
Painting and varnishing, includ-	
ing labor	80.00
Carpenter work	260.00

\$1,200.00

First Prize for Five Hundred Dollar Cabin-W. H. Gwin



SPECIFICATIONS FROM W. H. GWIN,

South Gifford, Mo.

Foundation—concrete block.

Sills box.

Floor joists, 2x8s, No. 1 yellow pine, 16 inches on center B. & B.

Flat grain yellow pine flooring.

Studding, 2x4, No. 1 yellow pine on 16-inch centers.

Siding—yellow pine drop siding No.

Ceiling joists, 2x6, No. 1 yellow pine on 16-inch centers—lath Y. P., plastered with gypsum cement plaster, 2 coats.

Rafters—No. 1 Y. P., 2x4 on 24-inch centers

Yellow pine No. 2 sheathing shingled with 5-2, clear red cedar shingles 5-in. to the weather.

All finish lumber B. & Better yellow pine finish.

Caps, casings, base and aprons all above yellow pine finish.

Plancions B. & B. yellow pine flat grain flooring, painted three coats with S. W. or as good grade ready-mixed paint, papered with a medium grade paper.

Estimate

Foundation	45.00
Flue	15.00
Lumber, carpenter work, etc	350.00
Plaster and plastering	35.00
Paint, paper, etc	50.00
Incidentals	5.00
\$	500.00
Addition	
Foundation	36.00
Plaster and plastering	32.00
Paint, paper, etc.	35.00
Lumber, millwork, etc	200.00
Wrecking	10.00
Incidentals	7.00

ESTIMATE FOR A \$500 SETTLER'S CABIN, SUBMITTED BY CHARLES A. RAIS,

\$320.00

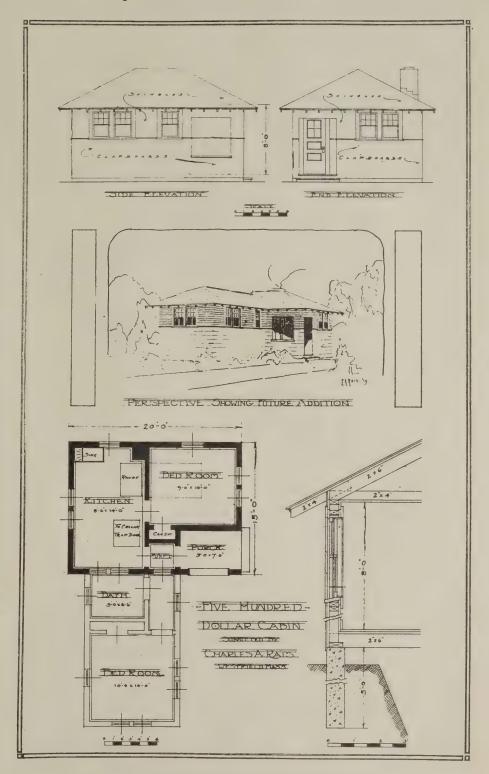
Westfield, Mass.

Cabin to consist of one large kitchen combined with dining-room, bedroom and porch. Kitchen to have trap door to cellar, as shown. Future addition to consist of bedroom and bath.

Estimated Cost

Lumber and millwork	\$211.75
Labor	
Excavating	10.00
Concrete and chimney	100.00
Plaster	
Hardware	10.00
Painting	10.00
Miscellaneous	18.38
Total	\$500.00

Special Mention—Chas. A. Rais



CONDITIONS OF THE COMPETITION

This competition announced in the January number of NATIONAL BUILDER, owing to a variety of causes, more particularly because of pressure of business attending the re-awakening of building activity, preventing contestants completing their plans and the slowness involved in obtaining the individual decisions of the judges, was unavoidably delayed.

The conditions in the main and the prizes offered in the announcement were:

One prize of \$75 for a house to cost not over \$3,500.

This house to accommodate a man and his wife, two sons, one daughter, and one hired man. It is to have one room on the first floor which can be used as an office, den or emergency bedroom; also a screened-in back porch, and sufficient accommodations for supplying meals to additional farm help.

One prize of \$75 for a house to cost not over \$1,200.

For a man and his wife and one hired man.

One prize of \$50 for a settler's cabin to cost not over \$500.

To house a man and wife comfortably during their first few years on the farm. This design must also include a suggestion for enlarging the house at a later date, at an additional cost of not more than \$400.

General Suggestions for the Competitors Were as Follows

It goes without saying that it is desirable to get the very best designs possible for construction at these prices. It is realized that the prices are very low, but it is necessary to place them low in order to come within practical limits. With no limit on expense, one could easily design an ideal farmhouse; but the number of farmers who can afford to build, irrespective of expense, are very few, indeed. The three classes which have been indicated above will, it is believed, cover by far the larger number of demands for farmhouse construction.

It will, no doubt, be surprising to some that the prize for the \$1,200 house is the same as the prize for the \$3,500 house. The foregoing paragraph will perhaps explain why this is; for there are many more demands for \$1,200 houses on the farm than for \$3,500 houses, while the lower priced house has, of course, not had as much attention given to it from the standpoint of design.

The limits which have been placed in this contest are such as make it absolutely necessary for the designer to eliminate all extravagances, to use his materials to the best advantage, and to design with particular reference to economies of construction.

The estimates accompanying the specifications made by each contestant are presented without comment beyond what we have already pointed out—they are probably too low, but how low each reader must discover by comparing with the prices at present prevailing in his locality.

Serviceable to Papa

A Red Cross Public Health nurse in a southern town has found the latest novelty in names for babies. She was weighing a little black youngster.

"What do you call your baby," she asked the grinning young mother.

"Weathah-strips," replied the parent.
"Weather-strips," exclaimed the nurse.
"What's the idea, Mandy?"

"We done named her Weathah-strips cause she kept her papa outa de draft."

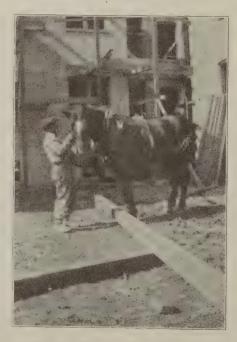
Jim

Jim, like many of his brothers, furnishes the power for a hoisting elevator. There's a difference though, as Jim doesn't require a driver. He works in obedience to a gong instead of a whip. He feels his responsibility mightily and is always on the alert. When the gong



Jim takes a minute off to pose for his picture, but he pawed in impatience because the camera man was slow

taps, Jim is off and he has the hoist to the top of the tower before a driver could get an ordinary horse started.



Pay-day for Jim

Jim's boss is Antonio Sose, who also owns the hoisting apparatus. They go from job to job wherever they are needed and work together, Jim furnishing the power for the hoist and Jim's boss working as a laborer, providing the load, in the shape of bricks, mortar, lumber and so forth.

Jim is a worthy member of the builder's craft. He does his work in an intelligent manner and without being driven to it. The fact that his working conditions are not always ideal does not make him dissatisfied. He probably realizes that his boss is not altogether to blame for some discomforts. He takes things as they come and makes the best of them.

As it is, he is a respected member of the fraternity. If he kicks over the traces he may enjoy a short period of rather pleasant independence, but he will lose something that can never be regained. He will lose the trust and confidence of his boss, and instead of being more or less a free agent he will be driven to his task. Every minute of the day his boss will stand over him with a whip. Instead of an occasional apple or lump of sugar he will receive frequent kicks and wallops. Instead of being a respected worker he will become a slave. Bones will take the place of flesh on his sleek sides and he will become thoroughly displeased with himself and the world in general.

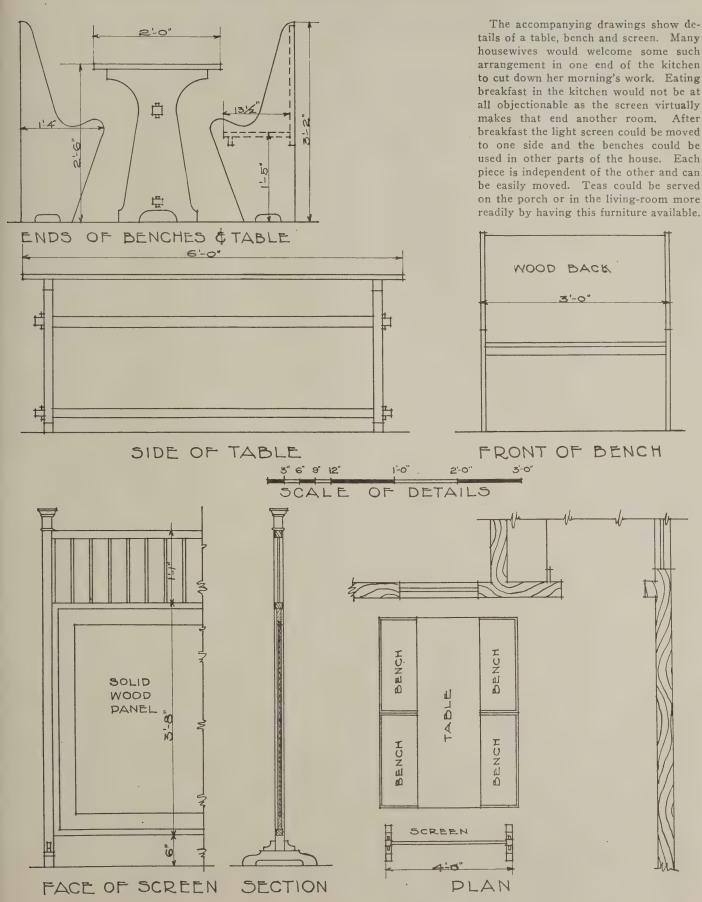
Cause of World's Disorder

The present state of disorder over the world is due to a want of comprehension of the fundamental necessity for community co-operation, and of the obligation that rests upon each individual to so govern his own actions that he will not infringe upon common rights which are essential to the community life.

Society in its efforts to find the most effective methods of production seems to have developed industry beyond the comprehension of the population or beyond the sense of individual loyalty or obligation to the community of which each is himself a dependent part.—George E. Roberts, Vice President National City Bank of New York.

OFTEN during building operations or remodeling the brick or tile work about the fireplace, porch and the foundations will be disfigured by splashes of mortar, plaster or stucco which it seems impossible to remove by ordinary means. A solution of muriatic acid applied with a stiff brush will turn the trick quickly and easily. Only be sure to wash the acid off carefully afterwards or it will leave a stain.

Portable Breakfast Room



MEMORIAL

Of the National Federation of Construction Industries in Relation to the Needs of the Construction Industry

To the Senate and the House of Representatives of the United States of America, in Congress Assembled:

Your petitioners respectfully represent that they are an association of persons and national and local organizations concerned as manufacturers or contractors or otherwise in the building or construction industry of the United States.

That the present condition of shortage in building and structures has been largely brought about through the curtailment of the construction industry by the Government during the war.

That the tendency of the Federal Reserve System, admirable in its general effect upon the business of the country, has been to promote the use of capital upon short term loans, made through national and other banks.

That the attraction of capital to such loans has drawn capital away from long term loans based upon mortgage on real estate.

That the erection of the required dwellings and manufacturing buildings, by increasing the plant facilities of the United States, will tend to increase production and decrease prices.

That there is a need at the present

time in the United States for from 600,000 to 1,000,000 new dwellings as homes for workmen and others and of many other buildings for business and other purposes, which constitute cumulated requirements caused by the nearly complete cessation during the war of building for other than war purposes.

That the preference created by the Federal Reserve Law for the investment of capital in commercial discounts and other like forms of investment has resulted in withdrawing large sums of money from availability for loans on building and real estate, and has thus greatly hindered the construction industry and increased the difficulty attendant upon the restoration of normal conditions in the construction industry.

After careful consideration of the situation, as above outlined, the National Federation of Construction Industries is convinced that a comprehensive study should be made of: The sources of capital available for home and other building purposes, the recent withdrawal of capital from long term mortgages on real estate, the causes of such action, the unfortunate results to the construction industry and to those who de-

sire to own and occupy buildings for production or for dwelling purposes, and the possibility of legislative correction of the evils unintentionally created by otherwise beneficial legislative action.

The National Federation of Construction Industries therefore respectfully memorializes the Congress of the United States that a sub-committee of the Committee on Banking and Currency of the Senate and Ways and Means of the House of Representatives, or a joint committee of both Houses of Congress, be appointed to make an investigation of the matters above outlined, to the end that there may be developed a modern system of long term banking, complementing, but not conflicting with, the Federal Reserve System, so that the nation's wealth may be more completely mobilized both for times of peace and for times of emergency, and so that national development may be promoted during the period of reconstruction.

ERNEST T. TRIGG,
President.

Attest: 31 October, 1919.

JOHN C. FRAZEE, Executive Secretary.

Resolution of the National Federation of Construction Industries Relative to Bill S-2094

WHEREAS: The operation of the revenue and banking laws of the United States has caused a steady withdrawal of capital available for loans upon real estate and has thus seriously interfered with the progress of building construction and national development; and

WHEREAS: It is highly important, not only to the construction industry, but to the welfare of the nation at large that the erection of homes and other needed buildings shall be speedily resumed; and

WHEREAS: Loans upon real estate should be at least as attractive as other forms of investment if the erection of homes and other needed buildings is to continue; it is therefore

RESOLVED: By the Directors of the National Federation of Construction Industries, that they heartily endorse the purpose of, and earnestly recommend the passage of S. 2094, introduced by Senator William M. Calder, of New York, entitled "A Bill to Encourage the Building of Homes by Providing for Exemption from Taxation of the Income from Mortgages on Real Estate," modified as Congress in its wisdom may deem necessary; because the passage of this Bill will tend to restore the balance in attractiveness to investors between loans upon real estate and other forms of investment, which balance has been destroyed through the operation of the existing laws, and because such restoration will encourage the construction of homes and other buildings now requisite to the happiness and prosperity of the people of the United States.

RESOLVED FURTHER: That the Executive Secretary be requested to communicate to Senator Calder, Representative Nolan and Representative Mc-Laughlin the appreciation of the Directors of their interest in this important matter, and that a copy of these resolutions be laid before them.

RESOLVED FURTHER: That a copy of these resolutions be sent to the

Committee on Banking and Currency of the Senate and to the Committee on Ways and Means of the House.

ERNEST T. TRIGG,

Attest:

President.

31 October, 1919.

JOHN C. FRAZEE,

Executive Secretary.

Resume of Bills Named

Text of Bills S. 2094 and H. R. 8080, 66th Congress, First Session.

In the introduction of this Members' Service Letter reference was made to Bill S. 2094, introduced by Senator Calder on June 18, 1919; and to Bill H. R. 8080, introduced by Representative McLaughlin, of Michigan, on July 31, 1919. The text of these bills follows:

S. 2094. "A Bill to encourage the building of homes by providing for exemption from taxation of the income on mortgages on real estate."

Be it enacted by the Senate and House

of Representatives of the United States of America in Congress assembled, that paragraph (b) of Section 213 of the Revenue Act of 1918 is hereby amended by adding thereto a new subdivision, to read as follows:

"(9) The amount received by an individual as interest on an aggregate principal not to exceed \$40,000 of loans secured, under mortgage or otherwise, solely by real estate."

H. R. 8080. "A Bill to encourage the building of homes by providing for exemption from taxation of the income of mortgages on real estate."

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that paragraph (b) of Section 213 of the Revenue Act of 1918 is hereby amended by adding thereto a new subdivision, to read as follows:

"(9) The amount received by an individual as interest on an aggregate principal not to exceed \$40,000 of loans secured, under mortgage or otherwise, solely by real estate and bearing interest at not to exceed five per centum per annum."

Bills S. 2492 and H. R. 7597—66th Congress, First Session

In the introduction of this Members' Service Letter reference was made to Bill S. 2492, introduced by Senator Calder on July 15, 1919; and to Bill H. R. 7597, introduced by Representative Nolan on July 19, 1919. The text of these bills is practically the same and their aim is identical. The purpose of these Bills was approved by the Board of Directors at its meeting held on July 31, 1919, as announced in Members' Service Letter No. 4 and News Letter No. 7, page 12. Bill S. 2492 was introduced to take the place of S. 1469, mentioned in the said Members' Service Letter and News Letter.

The purpose of these Bills is to "encourage home ownership and to stimulate the buying and building of homes; to create a standard form of investment, based on building association mortgages; to create Government depositories and financial agents for the United States; to furnish a market for Government bonds; and for other purposes."

The Act would create a system of Federal Building Loan Banks operating under the general supervision of a Superintendent in the Department of the Treasury. It is provided that each such bank shall begin business with a paidin cash capital of not less than One Hundred Thousand Dollars in shares of One Thousand Dollars each. Only building associations may purchase or hold stock of such banks. Each bank

shall be managed by seven directors, selected by the member associations composing the bank. It is provided that such banks, when designated for the purpose by the Secretary of the Treasury, shall be depositories of public money, except receipts from customs, under such regulations as may be prescribed by the Secretary. No Government funds so deposited shall be invested in building loan bonds.

Any member of any Federal Building Loan Bank, desiring to obtain funds, shall file an application designating the amount needed and accompanied by a schedule containing a list and description of the first mortgage securities which the borrowing member proposes to offer as collateral for the advances required. According to the Senate Bill, such schedule shall exhibit no mortgage in excess of Six Thousand Dollars; according to the House Bill, the limit is placed at Five Thousand Dollars. The security thus taken upon a loan to a member association from the Federal Building Loan Bank shall be at least twenty-five per centum in excess of the loan asked for, and no advance shall be made to any member that shall exceed twenty times the par value of the stock of the Federal Building Loan Bank owned by said member. No mortgage shall be accepted as security for any advance unless it shall be a mortgage upon a dwelling house and no such mortgage shall be accepted as security where the balance unpaid thereon exceeds seventy per centum of the appraised value of said mortgaged property.

The length of the Bills makes it inadvisable to reprint them here. Copies of the Bills may be obtained upon application to the clerks of the two Houses of the Congress, respectively.

The Strength and Stiffness of Floors and Ceilings

Referring to the article bearing the above title in the July issue of NATIONAL BUILDER, by Ernest I. Freese, Mr. Wharton Clay, commissioner for the Associated Metal Lath Manufacturers, comments: "The deductions Mr. Freese has made, and the reasons given in his article, are very logical, indeed, and you are forming a valuable function to bring this information before all builders that it may be better understood by them.

"One of the important reasons why metal lath minimizes plaster cracks is found in Mr. Freese's analysis of bridging. He calls particular attention to the fact that bridging is valueless without the truss-chords. Now, it is well known that an upper chord is provided by the flooring above, and when metal lath is stapled onto the bottom of the

joists a steel tension chord is provided, just the same as a steel tension chord is often provided in a wooden bridge where the upper chord and diagonals are of wood and the lower chord is of steel.

"Mr. Freese's article leaves the solution open, except where furring or stripping is used, and this, of course, is seldom done, and it is not essential when metal lath is used."

Co-operative Farm Building

A modern counterpart of the oldfashioned barn raising, with certain noteworthy features added, in the form of assistance by State authorities, has appeared in Marshall County, Iowa, where the farmers have had difficulty in securing carpenters to co-operate in erecting their structures under the direction of the county agent and the farm building experts of the agricultural extension department of the Iowa State Agricultural College. Poultry houses, because of their simplicity, are being tried first, and will be built in the beginning under extension supervision, but after that the farmers are expected to duplicate the work on other farms. It is later planned to apply this experiment to more pretentious building enterprises.

A Fable for Builders

Last Summer a Good Citizen of a certain town not over a hundred miles from almost Everywhere, built a Wooden house for a Woman and her Children. He built the Chimney of Brick because he had to. The Chimney was able to Stand Alone, so he did not have to prop it with Wood. But the Floors of the house would not Stay Up without props. The Good Citizen saved a dollar by using the Chimney as a support to the floors. He nestled the ends of the Floor Joists nicely in the brick of the Chimney. He covered up the job and got his money.

The Rains fell and the Winds blew in the most Biblical manner, and Winter came, after its fashion. The Chimney Settled a little; and there was a tiny

One morning the Woman woke up with Fire all About her. She tried to get to her children. If she got to them no one Ever Knew it. The Good Citizen who built the house was Not Arrested for Manslaughter. He is building Other houses of the Same Kind for Other women and children.

He is making his Living by it.—Franklin H. Wentworth, Secretary, N. F. P. A.

Seattle Cleans House—By F. R. Singleton

SEATTLE is breaking her domination over her industries of the radical element of organized labor, which has held almost absolute sway in that city for the past three years, and has so restricted production and increased production costs that her shipyards, lumber mills, and many lesser industries have been finding it hard to compete with those in which the labor situation was less acute; that she was beginning to lose commerce to other Pacific ports, where the labor cost of handling cargoes was less; that she was losing new industries seeking location on the coast, which avoided Seattle because of industrial conditions.

Seeing her opportunity of becoming the greatest city on the Pacific Coast and one of the great ports of the world, slipping away from her, Seattle has risen in the might of an American city, and is breaking the tightening bonds which were beginning to strangle her industries and commerce. Seattle is rapidly going "open shop." Seattle has declared her independence of organized labor rule and is refusing even to deal with the radicals in control of organized labor in the city, whose course since the signing of the armistice has proven them to be no better in their actions, sentiments and purposes than the I. W. W.

They do not call it "open shop" in Seattle. They call it the "American Plan of Employment" which, as defined by the "Associated Industries of Seattle," the organization leading the movement to success, means that every man shall be protected in his inalienable right to work, regardless of political, religious or labor affiliations; that every employer shall be protected in his right to run his own business and to hire employes without having to gain the permission of an autocrat of labor.

The open shop is being established in Seattle by the breaking of a series of strikes, designed by the radicals in the labor movement as a substitute for the general strike, by which they planned to bring about the paralysis of industry in Seattle and so discourage employers that they would be able to take over industry themselves under a soviet system. The open shop is being established by the force of public opinion as the result of an intensive publicity campaign in the Seattle dailies, conducted by the Associated industries. Pages on pages of advertising informed the Seattle public that the industries and commerce of Seattle were being attacked by the radicals of organized labor and that, if

their dominance over organized labor and the industries and commerce of Seattle were not broken, the population, industry, commerce and prosperity of the city would decline.

The response was prompt, the Chamber of Commerce, the Rotary Club, the Kiwanis Club and all other civic and commercial organizations of the city took action demanding the end of radicalism and sabotage in Seattle, and endorsing the open shop in industry. These declarations were published in page advertisements, and at the end of ten days of this intensive advertising, the public sentiment in Seattle was overwhelmingly in favor of Americanism in industry, and the power of the radicals was broken. Where, a year ago, the closed shop was strongly supported by public opinion in Seattle, today the public is demanding open shop, and any employer who signs a closed shop agreement with any labor union will be exceedingly unpopular.

The movement in Seattle is not against unionism, but against the domination of unionism and industry by un-American radicals. The Associated Industries, in its publicity, has repeatedly recognized the right of workers, as well as employers, to organize; has endorsed the principle of collective bargaining; has declared that there shall be no discrimination against union men under the American Plan, and has urged employers not to take advantage of unemployment to cut wages. The Associated Industries has been consistently American and so has won the confidence of the public and of the conservatives of union labor.

Seattle is winning industrial independence by the power of organization. While the individual employer, with a few exceptions, in the past has been unable to withstand the radicals who ruled Seattle labor and has bowed to their dictates, the employers of Seattle collectively, banded together along with many other citizens in the Associated Industries, have been able to defy the radicals and to establish open shop in every Seattle industry in which a strike has occurred or a contract broken by the unions, during the past three months. In rapid succession, the building industry, the job printing industry, the merchant tailors, the dyers and cleaners, the jewelers, the shoe repair shops and the master pile drivers have declared and established their independence of radical domination, meaning that the unions have lost control of industries in which thousands of men and women are employed.

Seattle would progress on the open shop road much more rapidly, under the stimulus of public opinion, if it were not for the fact that the Associated Industries has taken a strong stand against the breaking of existing contracts with labor unions. One of the cardinal principles of the organization is that employers must keep faith with each other and with employes, and so the open-shop movement progresses as strikes occur, unions break contracts and existing contracts expire.

The Associated Industries was formed in Seattle as a result of the general strike of last February. The revolutionary character of that attempt was recognized by the public and the necessity of cleaning the radicals out of organized labor was brought home. There was much open-shop sentiment as a result of the general strike but, as a large percentage of union labor in Seattle is loyal American, the majority of employers favored giving the unions a chance to clean house of the radicals before taking any drastic steps. The Associated Industries, led by Frank Waterhouse, a leading citizen of Seattle, with large shipping and industrial interests, was organized to band all employers together in an effort to bridge the chasm between the employers and employes by giving the employes such a square deal that the revolutionary appeals of the radicals would fall upon deaf ears, and that labor would throw the I. W. W. and other radicals out of control of Seattle unions. During last spring and summer, the Associated Industries grew rapidly in membership and influence, and endeavored consistently to cultivate better relations between employers and labor, and to promote a square deal for the employe, the employer and the public in general in Seattle-but the unions failed to clean house.

The final declaration for the open shop in Seattle came when Mr. Waterhouse became convinced that the radicals, still in complete domination of the unions, were attempting, by a series of strikes. to paralyze the industries of Seattle and take them over. Advance information of this plan was verified by events. On Sept. 2 the carpenters and some of the other unions in the building trades struck to enforce impossible wage demands, in spite of the vital public need of more homes and other buildings and the willingness of the employers to arbitrate. They arrogantly stated that their demands, involving \$10 a day wage for carpenters and other exorbitant increases, must be granted first, and then they would talk arbitration. The job printers, the tailors, the dyers and cleaners and piledrivers followed in rapid succession and the air was full of talk of strikes in other industries.

On October 14, Seattle contractors, backed by the Associated Industries of Seattle, declared open shop in the building industry, after six weeks of fruitless negotiations with the unions to bring the strike to a settlement on terms which would not make it impossible for new buildings to be undertaken. Their action, announced in page advertisements in the daily newspapers, was applauded by the public. On October 31, the Building Trades Council voted to call the strike off. The strikers returned at their old wages and under open-shop conditions

"It took only one seven-column, fifteeninch advertisement in the Seattle dailies, announcing open shop and inviting men to work under the American Plan, to establish the piledriving industry on the open-shop basis. The fight has been harder with the job printers, the tailors and the dyers and cleaners, but the employers in each of these three industries declared unequivocally for the open shop and are making it stick. The

employing printers have been drawing men from all over the United States to take the place of those strikers who refuse to return to work, and are gradually building their forces up to normal. The tailors have been greatly helped by the fact that all the associations of employing tailors in the cities of the Pacific Coast, as far south as San Diego. California, have followed the example of Seattle and have declared open shop. The dyers and cleaners have gotten back many of their old employes and are back to normal in their operations. To have granted the demands made in any of these lines would have amounted practically to turning over the business to the employes.

The declaration of open shop by the building contractors was a body blow to union labor radicals and disarranged their plans to bring about industrial paralysis by involving one industry after another in strikes. A sentiment against strikes developed in the unions, and no more strikes were called.

Once decided for the open shop, the Associated Industries conducted an intensive publicity campaign in the three loyal daily newspapers of Seattle. In a series of ten page advertisements, beginning October 29, the Associated Industries aroused the community to the

danger of radical domination and demanded that the industries of Seattle be run on the American Plan. The campaign was assisted greatly by the newspapers themselves in strong editorial and news publicity.

At the end of ten days, public sentiment was strongly in favor of the open shop.

Then came the murder of four former soldiers by the I. W. W., during the armistice celebration parade at Centralia, Washington, a few miles from Seattle, and the suppression by the government of the disloyal Union Record, the organ of the radicals, to crystallize sentiment in Seattle against the reds in control of labor. The sentiment grew so strong that the elimination of the radical alone can save unionism in Seattle.

The movement for the American Plan, the open shop has spread from Seattle to the other cities of the Pacific Coast, and the Pacific Coast expects to see it sweep the country until the right of all Americans to work without being subjected to coercion and intimidation is established. San Francisco, Portland, Spokane and Tacoma have organized "Associated Industries" on the Seattle plan. The Pacific Coast is making a new declaration of independence for America.

Machines to the Front

THAT an increasing reliance must be placed upon machinery in the building industries is clearly realized by progressive builders. An appreciation of this is shown by the large number of new and ingenious labor-saving devices and methods being introduced. America's industrial progress is due as much to the inventive faculties of the people and their ingenuity in overcoming difficulties as to the country's great natural wealth. A builder may think he does not need a certain piece of machinery because he can only use it occasionally -but there may be other uses to which it can be applied and made to pay for its cost and keep. This is particularly true of trucks. There is an instance in the illustration, though in this case a tractor was employed.

On account of the scarcity of labor and the high cost of that which is available, this man, who lives in Newark, N. J., has undertaken with the aid of a few of his friends to build his own home. He is here seen raising the whole side of his house into place with the aid of a small tractor, which ordinarily would require the services of about fifteen men.



Copyright, 1919, Keystone View Co., N. Y.

Doing the service of fifteen men

Publications and Announcements

Mann & MacNeille, architects and construction engineers, New York City, announce the opening of a branch office in the Book Building, Detroit, Mich. The Detroit branch has been opened to aid the work of this organization in industrial housing, city planning, municipal expansion, and general architectural design and construction throughout the Middle West.

Spot Grounds, or Peds, for attaching wood or metal trim to walls, and screeds, or sleepers to floors, with details of the applications of metal lumber, are the subject matter of "General Fireproofing" (No. 8, Vol. 6), issued monthly by the General Fireproofing Co., Youngstown, Ohio.

Blawforms for Light Walls and Foundations—Bulletin No. 203, issued by the Blaw-Knox Company, Pittsburgh, Pa. This bulletin of 28 pages gives photographic illustrations of various types of commercial and industrial buildings and dwelling houses constructed with the Blaw light wall steel forms. Drawings and diagrams of the methods employed illustrate the explanatory text.

E-Cod Fabric—Ideal Reinforced Plastering Base—Leaflets illustrative and descriptive of the product of the E. D. Coddington Manufacturing Company, North Milwaukee, Wis. Issued by the distributers, MacAdams & Call, Conway Building, Chicago.

Expanded Metal Construction—Published monthly by the North Western Expanded Metal Company, 37 West Van Buren Street, Chicago. The November issue illustrates a variety of buildings constructed with the products of the company: Nemco Presteel lumber, sheathing lath and Econo sheathing lath. Diagram's and isochromatic drawings illustrate the methods of construction employed.

Information on Wood and Where to Find It is a bibliography giving the sources and ordering numbers of all sorts of plans for wood construction, issued by the National Lumber Manufacturers' Association, Lumber Exchange, Chicago.

Archer Hoist Tower Outfits and Concrete Spouting—Catalog No. 20, issued by the Archer Iron Works, Western Avenue and Thirty-Fourth Place, Chicago. Illustrative of a large variety of specialties indicated by the title, including drawings and diagrams of hoist tower construction.

No Surface No Floor-Folder issued

by the General Fireproofing Company, Youngstown, Ohio, illustrating the uses and applications of protective and dustproofing products for cement floors. Twenty-one special products are listed for special purposes.

Star Spring Hammer Drill—Illustrative and descriptive circular of a new labor-saving spring hammer drill with automatic drill turning feature. Issued by the Star Expansion Bolt Company, 147-149 Cedar Street, New York City.

Kelvinator is the title of a booklet illustrating and describing the machine for mechanical icing manufactured by the Kelvinator Corporation, 621 West Fort Street, Detroit, Mich.

The publications listed herein can be obtained on request. Keep a live file of catalogues and trade literature, Mr. Builder. It will pay you to keep posted

Art Stone and High Class Concrete Specialties—Circulars showing reproductions in facsimile colors of concrete and composition marbles, granites, and other stones used for mantels and decorative purposes come from the Art Stone Company, Waynesboro, Pa., offering instructions in their manufacture.

The Winslow Window Austral-Balance and Winslow Casements—Catalog showing photographs of the buildings in which these specialties are in use and illustrations of the various types. Issued by the Winslow Bros. Company, 542 West Twenty-Seventh Street, New York.

Buildings You Have Seen is a handsomely printed booklet with numerous photographic reproductions of modern commercial and industrial buildings in which the products of the Stanley Works, New Britain, Conn., have been specified.

Stanley Garage Hardware for Rolling Doors, as its title indicates, gives a comprehensive review of these products. Issued by the Stanley Works, New Britain, Conn.

Wisconsin Builders' Eighth Annual State Convention — Announcement is made that the eighth annual State convention of the Master Builders' Association of Wisconsin will be held at Racine, Wis., on Wednesday, Thursday and Friday, 7th, 8th, and 9th of January, 1920.

Upson Smiles, a recent publication of the Upson Company, Lockport, N. Y., announces that the use of wallboard as a standard material for walls and ceilings is shown by the fact that its sale has increased from 500,000 square feet in 1906 to upward of 600,000,000 square feet per year, or 120,000 per cent in 12 years.

Blueprints, by John F. Friese, issued by the Manual Arts Press, Peoria, Ill. (boards, 56 pages, 75 cents), is a complete treatise on blueprinting, giving information on making blueprints, brownprints and other types of prints in more or less common use.

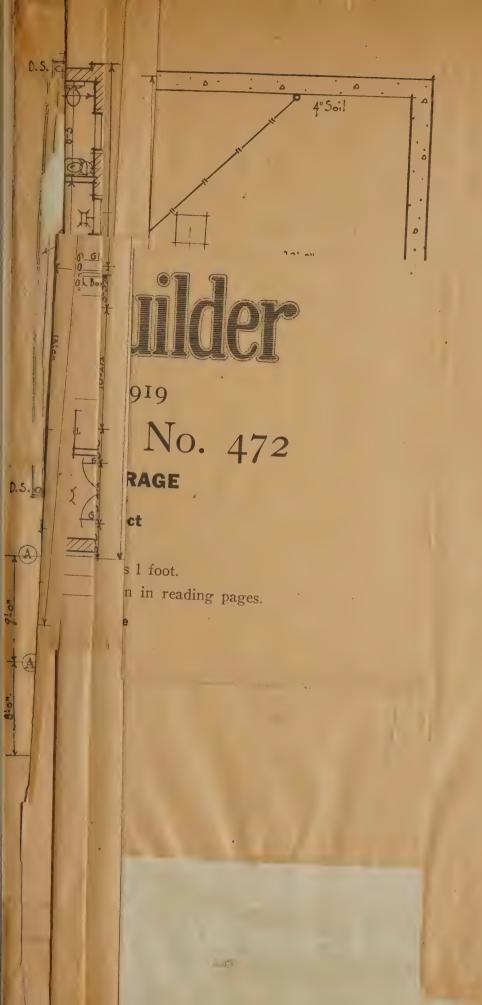
The Clark Trucktractor illustrates and describes a dual machine to replace wheelbarrows, hand trucks and other means of transportation within the factory or plant and in the yard, as a truck and a tractor in one. Issued by the Clark Trucktractor Company, Chicago.

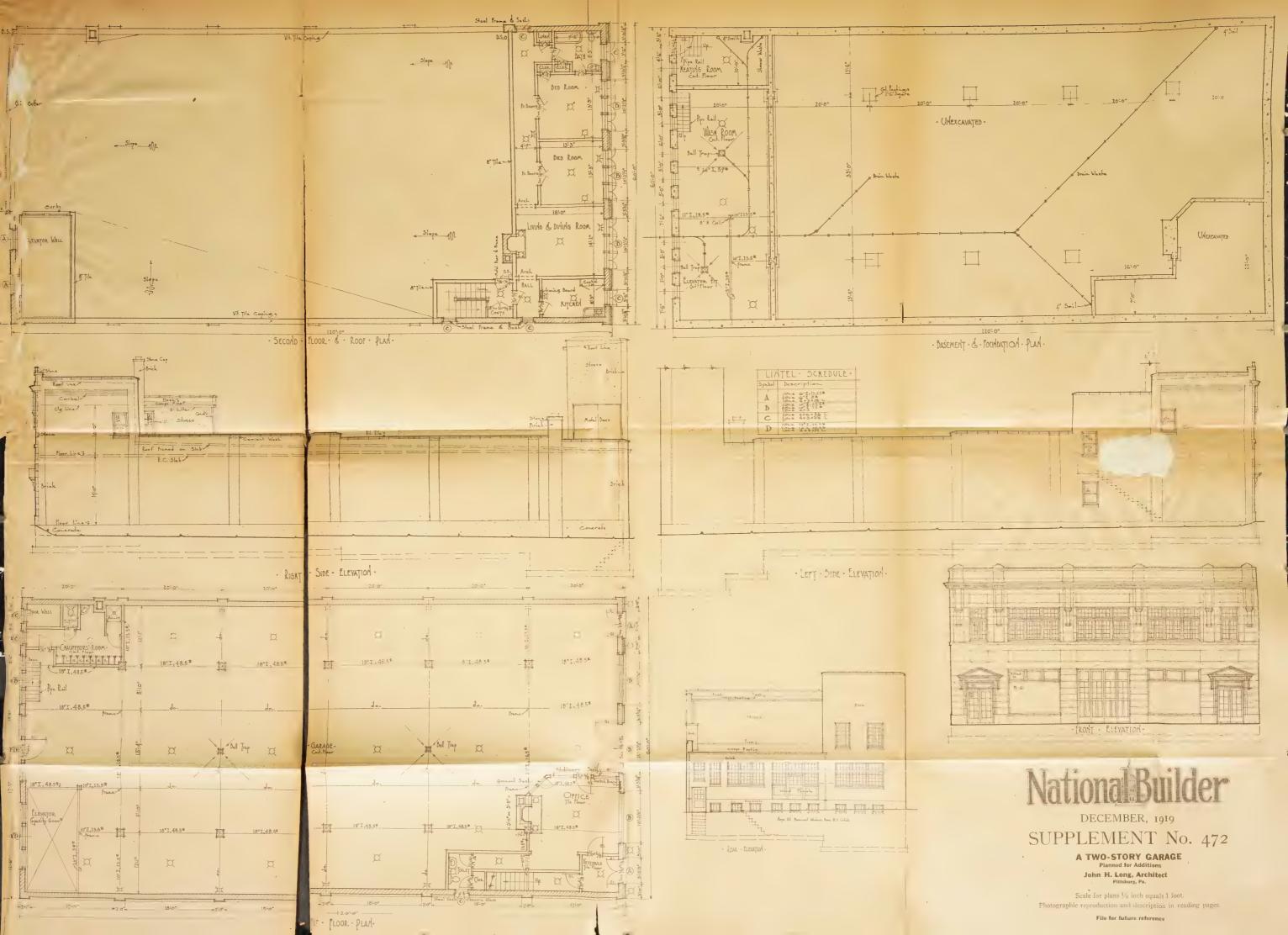
The Bishopric Manufacturing Co., Cincinnati, Ohio, announces the purchase of about ten acres of land in Ottawa, Canada, and have started the construction of factory buildings at that point for the manufacture of Bishopric board to supply the Canadian market.

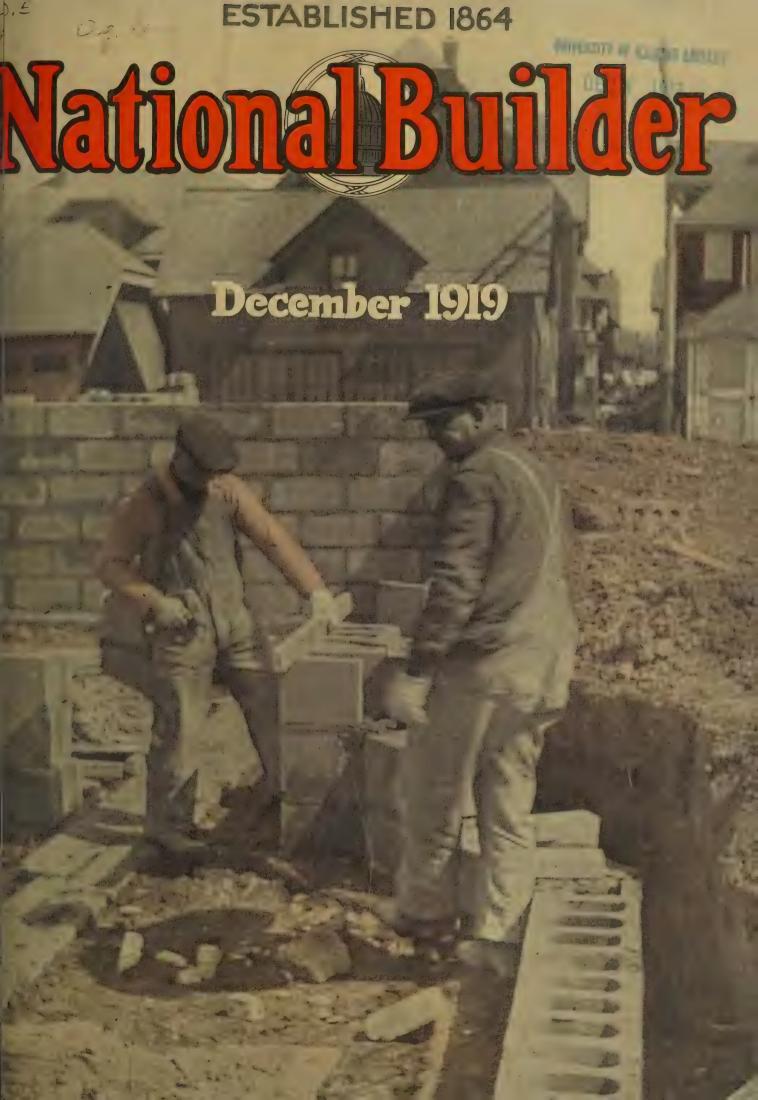
Thompson's Guaranteed Lightning Protection is the title of an elaborate 28-page brochure describing and illustrating in colors and bronzes the various appliances manufactured by the George E. Thompson Lightning Rod Co., Owatonna, Minn., for protection from lightning.

WINTER ACTIVITY IN HOME BUILDING

More than 72 per cent of the inquiries for home building information and house plans come from prospective builders in the winter and spring months, particularly the winter months, according to a recent analysis made by the Southern Pine Association. Of 135,089 requests for building helps, 97,433 came between November 1 and May 31, and of this 97,433—17,070 came in November and 17,921 in February. The season of greatest actual building activity is, of course, during the open warm weather months, but the planning and deciding are done in the winter and early spring.









Buyers' Guide

Asbestos Roofing

H. W. Johns-Manville Co. Asbestos Shingle, Slate & Sheathing Co.

Asphalt Paint

Heppes Roofing Division

Asphalt Shingles Beckman-Dawson Roofing Co. Heppes Roofing Division

Band Saws

The Silver Mfg. Co.

Barn Door Hangers

National Mfg. Co. J. E. Porter Co. Sharon Hardware Mfg. Co.

Barn Equipment Hunt, Helm, Ferris & Co.

Barrell Bolts

Griffin Mig. Co.

Beds

Murphy Door Bed Co.

Block Machines

Anchor Concrete Stone Co.

Blue Print Systems

Wickes Bros.

Boilers

Kanawha Mig. Co.

Brick Cleaning Machines N. T. Fuller

Builders' Hardware

Ph. Gross Hardware Co.
Hardware Sales Co.
F. D. Kees Mig. Co.
McKinney Mig. Co.
Monarch Metal Weatherstrip Co.
National Mig. Co.
Nicholas Hardware Co.
Stanley Works

Butts

McKinney Mfg. Co. National Mfg. Co. Stanley Works

Canvas

Wm. L. Barrell Co.

Carpenters' Tools

E. C. Atkins & Co. Henry Disston & Sons Mack & Co. North Bros. Mig. Co. Sargent & Co. Stanley Rule & Level Co. The L. S. Starrett Co. James Swan Co.

Ceilings

The Beaver Board Companies Black Rock Wall Board Co. The Edwards Mig. Co. W. C. Hopson Co. Niagara Wall Board Co.

Cement

Alpha Portland Cement Co.

Chemical Closets Sanitary Chemical Closet Co.

Clamps

James L. Taylor Mfg. Co.

Concrete Block Machines Anchor Concrete Stone Co.

Concrete Brick Machinery Helm Brick Machine Co.

Concrete Facings

Crown Point Spar Co.

Concrete Finishing Tools Abram Cement Tool Co.

Concrete Forms

Metal Forms Corporation

Concrete Marble

Art Stone Co.

Concrete Projecting Machine

Hodges Stucco Machine Co.

Concrete Reinforcements

General Fireproofing Co.

Copper

C. G. Hussey & Co.

Dampers

Colonial Fireplace Co. H. W. Covert Co. Stover Mfg. Co.

Damper Regulator

Sahlin Mfg. Co.

Derricks

Sasgen Derrick Co.

Door Beds

Murphy Door Bed Co.

Door Weatherstrips

Allmetal Weatherstrip Co. Sager Lock Co.

Drawing Instruments & Materials

E. Dietzgen Co.
Engineers' Equipment Co.
Kolesch & Co.
The Peerless Blue Print Co.

Drills

E. C. Atkins & Co. North Bros. Mfg. Co.

Dumbwaiters

J. G. Speidel Sedgwick Machine Works.

Elevators

The American Cement Machine Co. Kimball Bros. Co. Sidney Elevator Mfg. Co.

Expansion Bolts S.ar Fxpansion Bolt Co.

Engines

C. H. & E. Mig. Co.

Fireplace Fixtures

Colonial Fireplace Co. H. W. Covert Co. Stover Mfg. Co.

Floor Surfacing Machines American Floor Surfacing Machine Co. Wayvell Chappel & Co. Fox Supply Co. M. L. Schlueter

Flooring (Wood)

Eaglesfield-Stewart Co.
Oak Flooring Mfrs. Assn.
Wood Mosaic Co.

Furnaces

American Bell & Fdy. Co. Bovee Furnace Works Hardin-Lavin Co.

Hess Warming & Ventilating Co. Homer Furnace Co. Modern Way Furnace Co. L. J. Mueller Furnace Co.

Garage Door Hardware

McKinney Mfg. Co. F. E. Myers & Bro. National Mfg. Co. J. E. Porter Co. Sharon Hardware Mfg. Co. Stanley Works

Granite Facings for Concrete Crown Point Spar Co.

Hack Saws

The L. S. Starrett Co.

Heat Regulator

Sahlin Mfg. Co.

Heating Systems

Hardin-Lavin Co.
Hess Warming & Ventilating Co.
Homer Furnace Co.
Kanawha Mfg. Co.
Modern Way Furnace Co.
L. J. Mueller Furnace Co.

Hinges

Griffin Mig. Co. McKinney Mig. Co. Sharon Hardware Mig. Co. Stanley Works

Hoists

American Saw Mill Mchy. Co.

Hot Air Pipes

Hess Warming & Ventilating Co.

House Moving Equipment La Plant-Choate Mfg. Co.

Ice Boxes

Herrick Refrigerator Co.

Insulation

International Insulation Co.

Interior Trim

Curtis Companies

Joist Hangers

The W. J. Clark Co.

Levels

L. Beckman Co. Kolesch & Co. J. Sand & Sons Warren-Knight C David White Co. Co.

Locks

Nicholas Hardware Co.

Lock Mortisers

A. W. Miller Mfg. Co.

Lumber

American Hardwood Mfrs. Assa. Great Southern Lumber Co. Northern Hemlock & Hardwood Mfrs. Ass'n. Southern Cypress Mfrs. Assa.

Metal Forms

Metal Forms Corporation

Metal Lath

Berger Mfg. Co. General Fireproofing Co. The Sykes Metal Lath & Roofing Co. (Continued)

BUYERS' GUIDE—Continued

Metal Lumber

Berger Mfg. Co. General Fireproofing Co.

Metal Shingles

The Edwards Mfg. Co.

Metal Weatherstrips

The Allmetal Weather Strip Co. Sager Lock Co.

Millwork

Curtis Companies

Mixers

The American Cement Machine Co.
Bolte Mfg. Co.
Jaeger Machine Co.
Koehring Machine Co.
Little Whirlwind Mixer Co.
Oshkosh Mfg. Co.
Sheldon Mfg. Co.
The Standard Scale & Supply Co.

Nailing Machines

Pearson Mig. Co.

Oak Flooring

Eglesfield-Stewart Co. Oak Flooring Mfrs. Assn. Wood Mosaic Co.

Paints, Stains, Enamels

E. E. Nice

Pavers Oshkosh Mfg. Co.

Planes

Sargent & Co. Stanley Rule & Level Co.

Plaster Board

The Bishopric Mfg. Co.

Plumbs

J. Sand & Sons

Flumbing Supplies

Hardin-Lavin Co. B. Y. Karol

Refrigerators

Herrick Refrigerator Co.

Registers

Hess Warming & Ventilating Co.

Reinforcing Plates

Berger Mig. Co.

Rip Saws

American Saw Mill Mchy. Co. Parks Ball Bearing Machine Co. Sinker-Davis Co.

Roofing

Asbestos Shingle, Slate & Sheathing Co.
Barber-Cre-Sote Stained Shingle Co.
Wm. L. Barrell Co.
Beckman-Dawson Mfg. Co.
Berger Mfg. Co.
Creo-Dipt Co.
Creo-Dipt Co.
The Flintkote Co.
Heppes Roofing Division
H. W. Johns-Manville Co.
Vendor Slate Co.

Rules

The Lufkin Rule Co. Master Rule Mfg. Co.

Sash Balances

The Caldwell Mfg. Co.

Sash Chains Thomas Morton

Sash and Doors

Curtis Companies

Saws

E. C. Atkins & Co. Henry Disston & Sons Huther Bros. Saw Mfg. Co. Parks Ball Bearing Machine Co.

Saw Machinery

American Saw Mill Machinery Co W. F. & John Barnes Co. Crescent Machine Co. C. H. & E. Mfg. Co. Huther Bros. Saw Mfg. Co. Oshkosh Mfg. Co. Parks Ball Bearing Machine Co. Sidney Machine Tool Co. Silver Mfg. Co. Sinker-Davis Co.

Schools

American Technical Society Chicago Technical College Chief Draftsman Dobe Engineers' Equipment Co.

Screw Anchors

Star Expansion Bolt Co.

Screw Drivers

North Bros. Mfg. Co.

Screw Holes

Stine Screw Hole Co.

Sheathing

Asbestos Shingle, Slate & Sheathing Co.

Sheathing Lumber

The Bishopric Mfg. Co.

Asbestos Shingle, Slate & Sheathing Co.
Barker-Cre-Sote Stained Shingle Co.
Creo-Dipt. Co.
The Flinktote Co.
H. W. Johns-Manville Co.

Slate Roofing

Vendor Slate Co.

Spot Grounds

General Fireproofing Co.

Spruce

Brown Company

Stained Shingles

Barber Cre-Sote Stained Shingle Co. Creo-Dipt Company

Stains

S. O. S. Mfg. Co.

Steam Heating Systems Kanawha Mfg. Co.

Steel Lumber

General Fireproofing Co.

Steel Medicine Cabinets Hess Warming & Ventilating Co.

Steel Tile

The General Fireproofing Co.

Store Front Construction

Brasco Mfg. Co.
The J. W. Coulson Co.
Detroit Show Case Co.
Kawneer Mfg. Co.

Structural Tools

Wickes Bros.

Stucco

National Kellastone Co.

Stucco Applying Machine

Hodges Stucco Machine Co.

Stucco Board

The Bishopric Mfg. Co.

Stump Pullers

La Plant-Choate Mfg. Co.

Midland Terra Cotta Co.

E. C. Atkins & Co.
Henry Disston & Sons
P. Gross Hardware Co.
Huther Bros. Saw Mfg. Co.
Mack & Co.
North Bros. Co.
The Progressive Mfg. Co.
The L. S. Starrett Co.
James Swan Co.
Syracuse Twist Drill Co.

Lunken Window Co. Whitney Window Corp.

Varnishes, Fillers

E. E. Nice

Wallboard

The Beaver Board Companies
The Bishopric Mfg. Co.
Black Rock Wall Board Co.
Compo Board Co.
Cornell Wood Products Co.
Keashy & Mattison Co.
Niagara Wall Board Co.
Plastergon Wall Board Co.
The Upson Co.

Wall Ties

Sykes Metal Lath & Roofing Co.

Waterproofing

The General Fireproofing Co.

Water Supply Systems Hardin-Lavin Co.

Weatherstrips

The Allmetal Weatherstrip Co. Sager Lock Co.

Windows

Lunken Window Co. Whitney Window Corp.

Window Hardware

The Griffin Mfg. Co. Monarch Metal Weatherstrip Co.

Wire Cloth

The Gilbert & Bennett Mfg. Co.

Wire Lath

Clinton-Wright Wire Co.

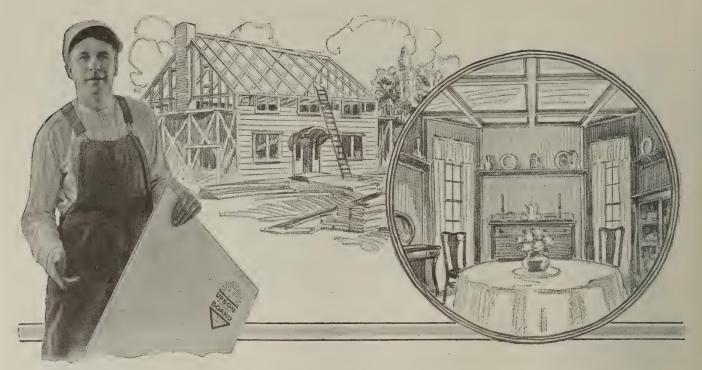
Woodwork

Bertelsen Adjustable Grille Co. Curtis Companies

Woodworking Machinery

American Saw Mill Machinery Co. W. F. & John Barnes Co. C. H. & E. Mig. Co. Crescent Machine Co. Huther Bros. Saw Mig. Co. Oshkosh Mig. Co. Parks Ball Bearing Machine Co. Sidney Machine Tool Co. Silver Mig. Co. Sinker-Davis Co. Standard Scale & Supply Co.





"The finer the home the more it needs Upson Board'

If I had my way, every fine home I build would have walls and ceilings fin-

and many and afford the ma

dainty tints or deep, rich

shades—with an appropriate stencil, if 1, in some of

deservedly will recall, l interior pictured paneled whether wood.

any wall market-and a race for paint than ser and other materials.

It is so good that many paint manufacturers use Upson Board to demonstrate the quality of their paint pro-

Costs Less to Finish

Upson Board comes to you surface filled or primed, ready for immediate decoration.

There is, however, no wax or paraffin in Upson Board to cause paint to spot, peel or blister. There is in some wall boards.

Upson Board is cheaper when applied and finished even though it may cost a trifle more at first.

Not Like Other Boards

Impartial tests on official machines show that Upson PROCESSED Board is nearly twice as strong as other wall boards.

Genuine Upson Board has the famous BLUE center and each panel also bears the Upson trade mark on the back. For your protection insist on the genuine.

Write for samples and booklet. Address The Upson Company, 152 Upson Point, Lockport, N. Y.

Better than plaster for walls and ceilings-especiallyforre-covering unsafe or unsightly plastered ceilings.



Made by the Fibre Board Authorities

PROCESSED

The Upson Company Lockport.N.y.

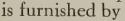
THE DEPENDABLE BOARD WITH THE FAMOUS BLUE CENTER



I T is no longer necessary to preach the vital importance of fresh air for schoolrooms. But fresh air, to be pure, must be *clean* air free from dust.

Dr. J. Gordon Ogden, an eminent professor of physics and chemistry, says: "More than half of all the deaths in the world are due to the distribution and breathing of dust."

Air that is already laden with dust may be admitted through open windows or ventilators. Or, it may pick up the chalk dust from blackboard mouldings and the germ infested floor dust tracked in by many feet and whirl it into the throats and lungs of pupils and teachers. The answer to the problem "How to keep fresh air clean"





Clean Air

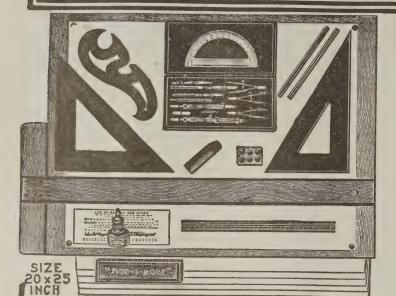
In schools and college buildings everywhere, as in hospitals, public buildings, theatres, churches, office buildings and industrial plants, apartment houses, residences and other buildings of every kind, TUEC Vacuum Cleaning Plants outnumber all others. Write for catalog.

THE UNITED ELECTRIC COMPANY

Canadian Plant - Toronto, Ont.

CANTON, OHIO

Drawing Outfit Drawing Table



Special Offer to

Yes, I will give you this complete drawing outfit absolutely free. The instruments are in a handsome high class, plush lined folding case. They are regular draftsman's working instruments. Besides I will give you absolutely free, a 20 x 25 inch drawing board, a 24 inch T square, a 12 inch rule, a supply of drawing paper, two triangles, a French curve, pencils, erasers, thumb tacks, etc.

elivered at Once

The drawing table is the "Chief's Own" adjustable folding Drawing Table, same as used and needed by first class drafts. men. The complete outfit and table are delivered to you at once. You have them to work with from the very first day. Find out about this offer. Write today.

Be a Uraftsma Draw \$25000 to \$30000 Per Month

There is an urgent demand for skilled draftsmen. Companies are issuing calls every day for men to fill positions paying from \$250.00 to \$300.00 per month. Builders are peculiarly fitted to make big successes as expert draftsmen. Send the coupon now.

hief Draftsman

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I am Chief Draftsman of a large and well known firm. I know just the kind of train-ing that is demanded from men who get big salaries. I want to train a limited number of builders to take big paying drafting positions. I train you by giving you actual, practical work, the kind that

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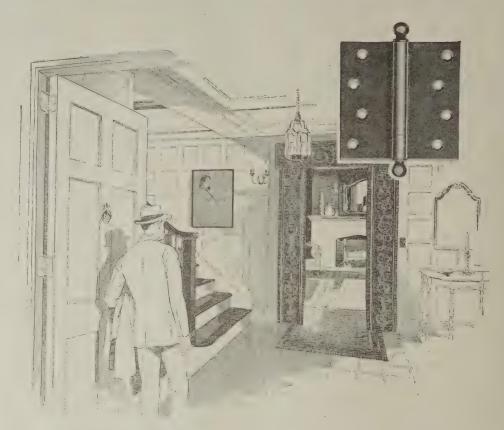
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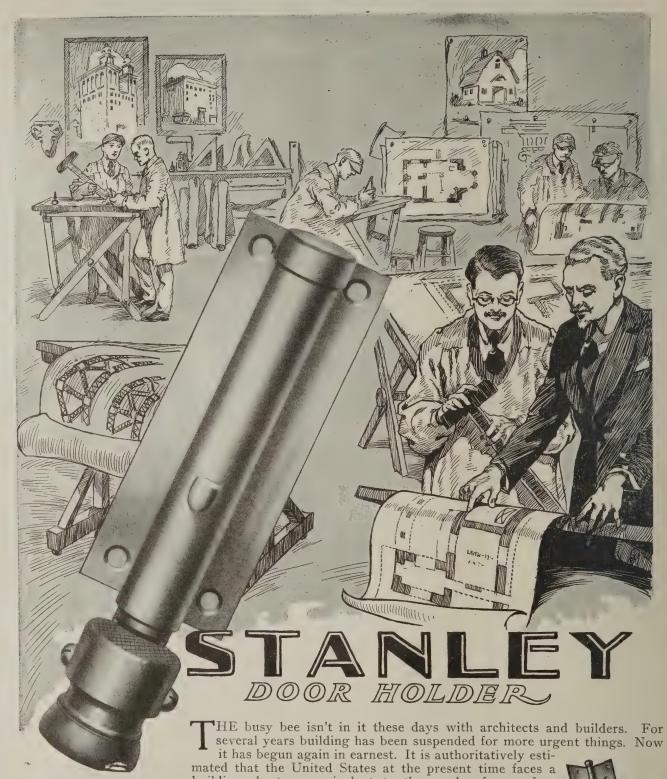
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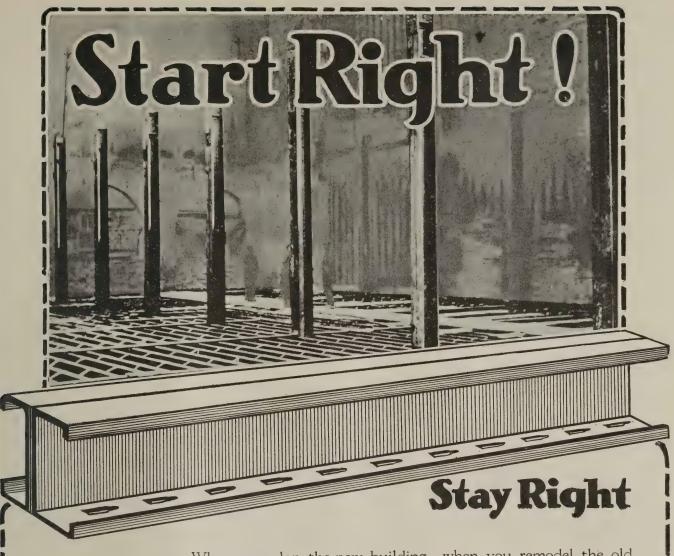
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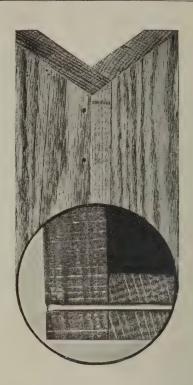


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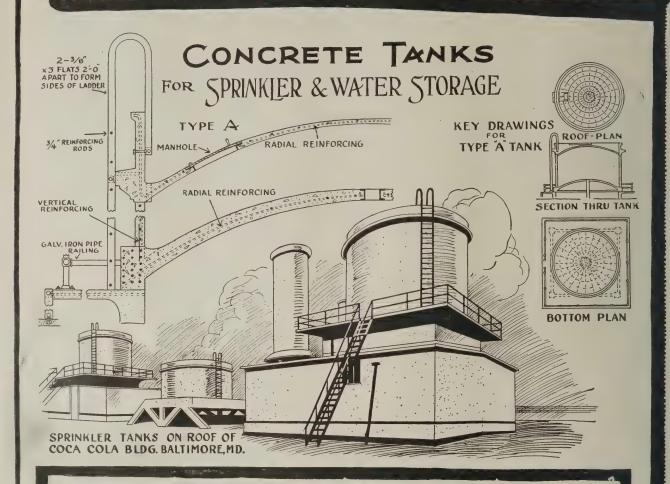
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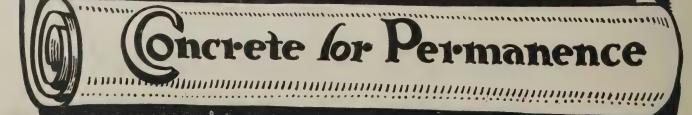
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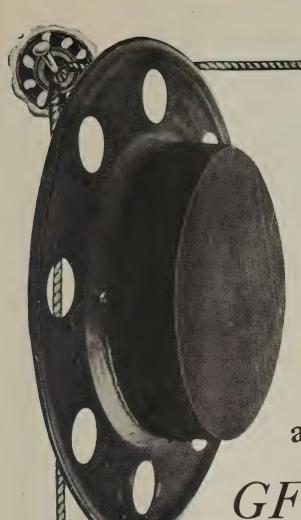
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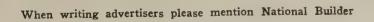
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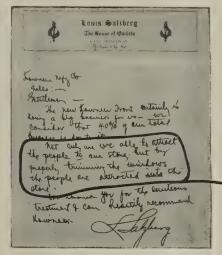
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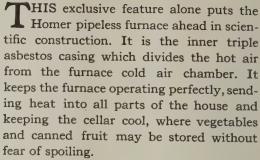
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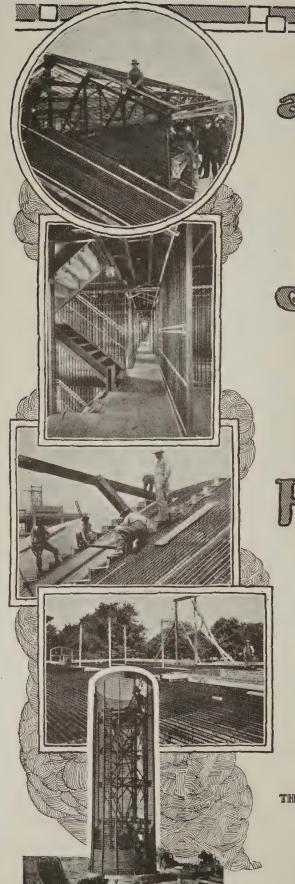
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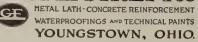
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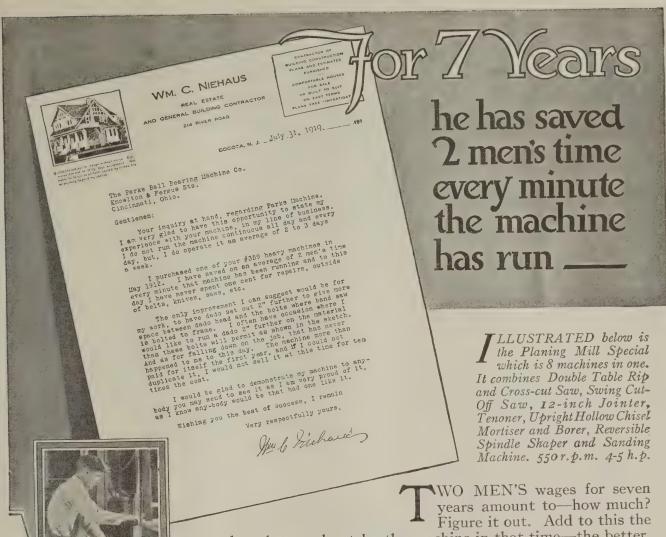
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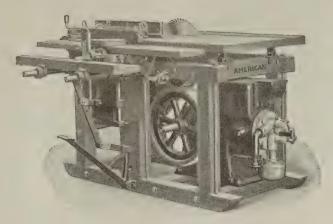
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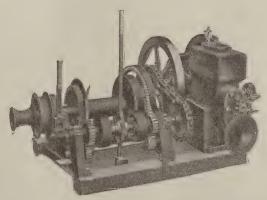
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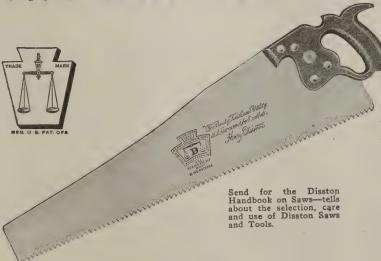
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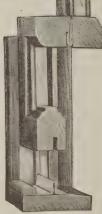
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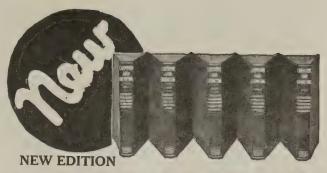
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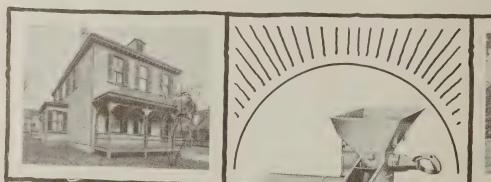
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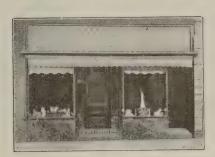
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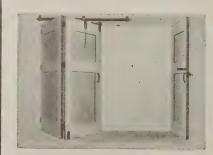
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Patented Oct. 16, 1917—others pending Showing 3 Door Equipment

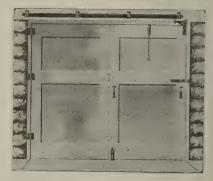
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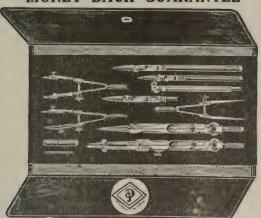
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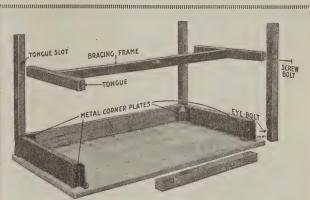
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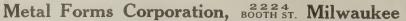


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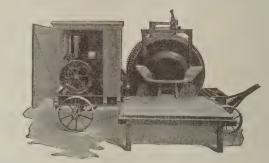


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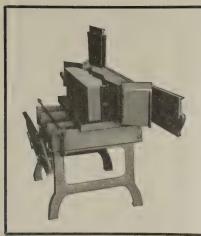
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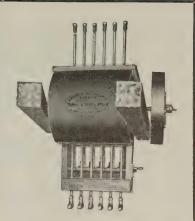
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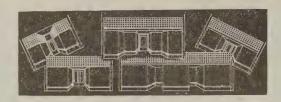


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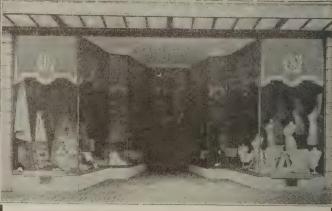
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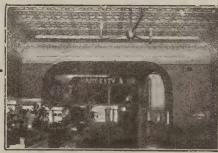
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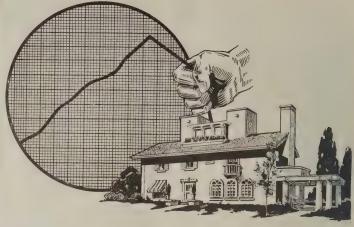
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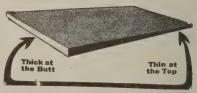
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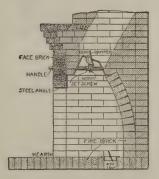
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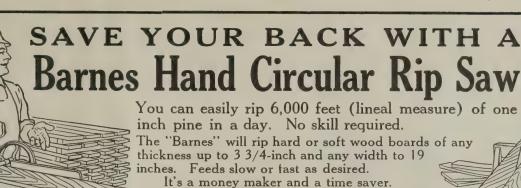
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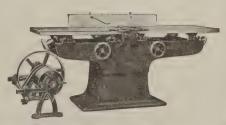
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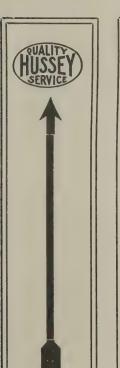


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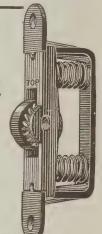
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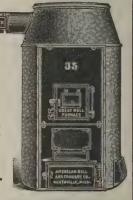
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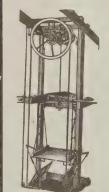
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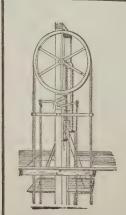
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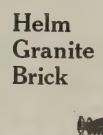


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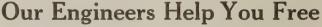
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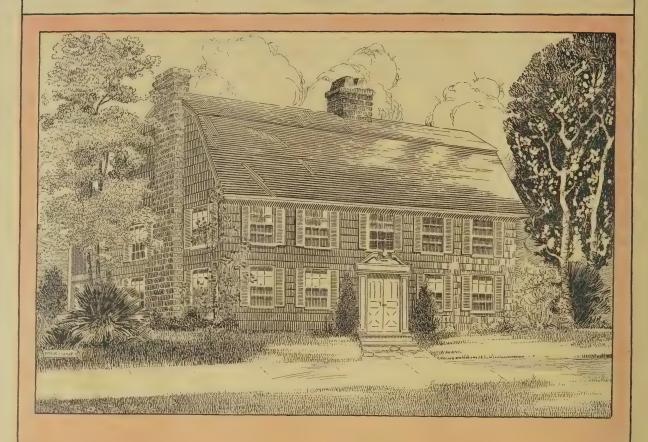
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